olivetti

Technical Assistance Service

TETRACTYS

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Contents

Use and features . . . . p. 5

Operation . . . . » 15

PART I - ADDITION AND SUBTRACTION

I. Foreword . . . . p. 16
II. Entry
a) *Keyboard and slide* . . . . . . » 18
b) *Escapement* . . . . » 20
c) *Column indicator* . . . . . . » 20
III. Registers
a) *Structure of the registers* . . . » 22
b) *Locating and locking the registers* . » 22
c) *Unlocking the register wheels* . . » 22
IV. Execution . . . . » 24
V. Transfer of the tens
a) *Foreword* . . . . » 26
b) *Primary transfers* . . . . . . » 26
c) *Secondary transfers* . . . . . . » 28
VI. Engagement and disengagement of the registers during calculation
a) *Presetting the second register* . . » 30
b) *Presetting the first register* . . » 32
c) *Non-add* . . . . » 32
d) *Engagement and disengagement control* . . . . » 34
VII. Inversion of the registers durin calculation
a) *Foreword* . . . . » 36
b) *Second register* . . . . » 36
c) *First register* . . . . » 36
VIII. Credit balance
a) *Circular transmission* . . . . . » 38
1) *Second register* . . . . . . » 38
2) *First register* . . . . » 38 b
b) *Balance sign indicator* . . . . . » 40
1) *Second register* . . . . . . » 40
2) *First register* . . . . » 42
XI. Printing mechanism
a) *Presetting the printing* . . . . . p. 44
b) *Printing control* . . . . » 46
X. Platen line-spacing . . . . » 48
XI. Dater . . . . » 50
XII. Slide restoring . . . . » 52
XIII. Repetition of the figure entered . . » 52
XIV. Complete clearing of the entry . » 54
XV. Clearing of the last digit entered . . » 54
XVI. Clutch and motor starting
a) *Cycle control* . . . . » 56
b) *Extra-cycle control* . . . . . . » 56
c) *Motor, tension switch, speed regulator and spark-extinguisher* . . » 56 b
XVII. Total
a) *Foreword* . . . . » 58
b) *Presetting extra-cycle* . . . . . » 58
1) *Repeat release* . . . . . . » 58
2) *Ribbon lifting* . . . . . . » 58
3) *Presetting the double line-spacing* » 58
4) *Inversion of the registers* . . » 60
5) *Slide half-step* . . . . . . » 62
6) *Selection of the register* . . . » 64
c) *Cycle of total* . . . . » 64
1) *Total in the second register* . . » 64
2) *Sub-total in the second register* . » 64
3) *Total in the first register* . . » 64 b
4) *Sub-total in the first register* . » 64 b
5) *Register engagement and disengagement control during total* . » 66
6) *Register engagement and disengagement control during subtotal* . . . . » 66
XVIII. Special signs
a) *Second register* . . . . » 68
b) *First register* . . . . » 68
c) *Credit balance sign* . . . . . . » 70
XIX. Ribbon movement
a) *Ribbon advance* . . . . » 72
b) *Ribbon reverse* . . . . » 72
c) *Printing in black* . . . . » 72
d) *Printing in red* . . . . » 72
XX. Paper-tape holder and papel guide plate . . . . » 74

PART II - MEMORY, MULTIPLICATION AND DIVISION

XXI. Memory . . . p. 76
XXII. Memory input . . . » 78
XXIII. Memory clearing . . . » 80
XXIV. Memory reading . . . » 82
XXV. Printing the memory sign . . . » 84
XXVI. Short-cut multiplication method . . . » 86
XXVII. Entry of multiplication factors . . . » 88
XXVIII. Multiplication control
  a) *Depressing the key* . . . » 90
  b) *Locking for lack of multiplicand* . . . » 90
  c) *Locking by excess of factors* . . . » 92
XXIX. Slide restoring control . . . » 94
XXX. Printing the multiplicand . . . » 94
XXXI. Printing the multiplicand sign . . . » 96
XXXII. Hooking the multiplication slide . . . » 98
XXXIII. Operating sense control
  a) *Foreword* . . . » 100
  b) *Positive multiplication* . . . » 100
  c) *Negative multiplication* . . . » 100 b
XXXIV. Register engagement control . . . » 102
XXXV. Cycles number control
  a) *Tester release* . . . » 104
  b) *Stroke-counter* . . . » 104
  c) *Last step of the tester* . . . » 104 b
XXXVI. Slide escapement . . . » 106
XXXVII. Supplementary cycle control
  a) *Presetting* . . . » 108
  b) *Operating sense of the machine* . . . » 110
  c) *Number of cycles* . . . » 112
XXXVIII. Last multiplication cycle
  a) *Multiplication key release* . . . » 114
  b) *Slide restoring and small slide hooking* . . . » 116
  c) *Multiplication stopping for lack of multiplier* . . . » 116
  d) *Multiplication stopping on the last memory column* . . . » 116
  e) *Multiplication key release for lack of multiplicand and by excess of factors* . . . » 116
XXXIX. Automatic printing of the product . . . » 118
XL. Re-entry of the product into the memory . . . » 120
XLI. Accumulation of products and totals
  a) *Tetractys* . . . p. 120
  b) *Divisumma* . . . » 122
XLII. Division - Foreword . . . » 124
XLIII. Presetting the machine for division
  a) *Exclusion of slide restoring* . . . » 124
  b) *Hooking the small division slide* . . . » 124
  c) *Presetting the special signs printing* . . . » 124
  d) *Memory clearing* . . . » 126
XLIV. Printing of the dividend . . . » 126
XLV. Automatic tabulation
  a) *Presetting the tabulation* . . . » 128
  b) *Slide release* . . . » 130
  c) *Slide antirebonding* . . . » 130
  d) *Slide stopping* . . . » 132
XLVI. Division control
  a) *Closing the clutch* . . . » 132
  b) *Locking by excess of dividend or lack of divisor* . . . » 132
  c) *Locking by excess of divisor* . . . » 132 b
  d) *Register engagement control* . . . » 134
  e) *Exclusion of the circular transmission* . . . » 136
XLVII. Operating sense control
  a) *Register inversion anchor control* . . . » 138
  b) *Locating and locking the inversion anchor* . . . » 138
XLVIII. Formation of the quotient . . . » 140
XLIX. Slide back-space . . . » 142
L. Last division cycle . . . » 144
LI. Immediate stopping of the division . . . » 144 b
LII. Printing the divisor . . . » 146
LIII. Printing the quotient . . . » 148
LIV. Accumulation of the quotients . . . » 148
LV. Printing the remainder . . . » 150
LV. Lockings
  a) *Locking the machine starting during the entry* . . . » 152
  b) *Locking the machine starting during the slide travel* . . . » 152
  c) *Locking the numeral keyboard when the machine is at work* . . . » 152
  d) *Locking the numeral keyboard during multiplication* . . . » 152

e) *Locking the numeral keyboard during the division and during the servomechanism release* . . . . . p. 152 b
f) *Reciprocal locking correction keys-register keys* . . . . » 152 b

Assembly and adjustment . . . . » 155

Parts of the « Divisumma 24 » . . . . » 575

Motors . . . . » 587

Testing . . . . p. 599

Spare parts catalogue . . . . » 607

Springs . . . . » 627

Standard parts . . . . » 631

Divisumma 24 . . . . » 635

Connection between code number and symbol . . » 639

Connection between symbol and code number . . » 649

Use and features

The « Tetractys » is a super-automatic printing calculator equipped with two « registers » (both equipped with credit balance device) and a « memory » which can be operated separately or in conjunction.

The Tetractys carries out the four basic arithmetical operations printing all the factors involved.

Figures are entered on the keyboard in the some order and in the some way as they would ordinarily be written by hand and are printed horizontally. Multiplication may be followed by division, the products and quotiens being retained for subsequent calculations. Calculations of volumes may be performed using automatic re-entry of intermediate products and automatic accumulation for grand total. It is possible to transfer amounts from one « register » to the other, from the « registers » to the « memory » and from the memory to the registers. Special symbols identify all operations and results.

The Tetractys has a capacity of 12 columns entering and 13 columns totalling; its speed is of 235 cycles per minute.

The keyboard is composed of 10 keys besides the double and triple cipher keys.

The control keys placed on the right are divided into two groups. Each group has an add key and a subtraction key of one register and a subtotal key and a total key of the other register.

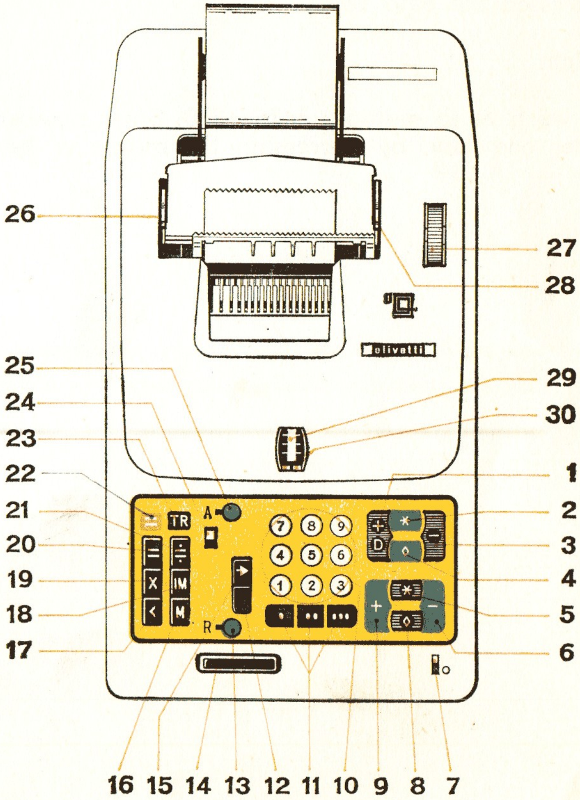
To obtain the transfer of a total from one register to the other either in addition or in subtraction it is sufficient to simply depress, at the same time, a total key and an add key or a near subtraction key.

With the automatic transfer key (**7**) set (thais moved forward), when a second register total key is depressed, the total is transferred, with its symbol, to the first register.

Please remember that it is also possible, once a number enterede, either to add or subtract it at the same time on the two registers or to add it on one register and subtract it on the other.

A special bar, operated by the thumb facilitates the execution of many additions to be entered on the second register.

1. Add key of second register and dividend entering key
2. Total key of first register
3. Subtract key of second register
4. Sub-total key of first register
5. Total key of second register
6. Subtract key of first register
7. Automatic register transfer key for products and quotients
8. Sub-total key of second register
9. Add key of first register
10. Numeral keyboard
11. Single, double and triple cipher keys
12. Keyboard clearing key
13. Repeat lever
14. Thumb add bar (second register)
15. Back space key
16. « Memory » reading and out put key
17. « No-add » and division stop key
18. « Memory » input key
19. Multiplier and constant multiplier entering key
20. Multiplication control key
21. Division control key
22. Negative multiplication control key
23. Transfer key for automatic re-entry of product
24. Date key
25. Automatic total lever
26. Line space selector
27. Platen knob
28. Paper release lever
29. Column indicador
30. Credit balance indicators



At the left of the numeray keyboard are placed the back space key and the keyboard clearing key.

Under these keys there is the « repeat » lever.

Besides, we note the « date » key; to obtain the printing of the date it is necessary to depress a control key after having depressed the date key.

Multiplication.

Suppose we have to multiply 3475×378. Enter number 378 (smaller one) and by depressing the multiplier key (**19**) Enter it in the memory. Enter number 3475 and depress the multiplication control key (**20**).

The machine preforms the operation and prints the result if the automatic total lever (**25**) is in operation that is shifted toward the left. If this lever is in rest position, to obtain the result of the multiplication it is necessary to depress a total key of the second register (**5**) or (**8**).

When the automatic total lever (**25**) is in operation and the automatic register transfer key (**7**) is also in operation (that is brought toward the front of the machine) the result of the operation is printed and transfered automatically into the first register.

Negative multiplication.

Suppose now we have to subtract.

$$700 - (25 \times 8)$$

Enter number 700 and add it in the second register (by depressing key [**1**]).

Enter number 8 and, by depressing the multiplier key (**19**), transfer it into the memory. Enter number 25 and depress negative multiplication control key (**22**).

The result of the multiplication will be automatically subtracted from number 700 entered into the second register.

The result of this subtraction will be printed automatically if the automatic total lever (**25**) is set. In this case the result of the operation: 500 will be printed on the tape.

Re-entering.

Suppose we have to perform the following operation:

$$3 \times 5 \times 6$$

Shift automatic total lever (**25**) toward the left.

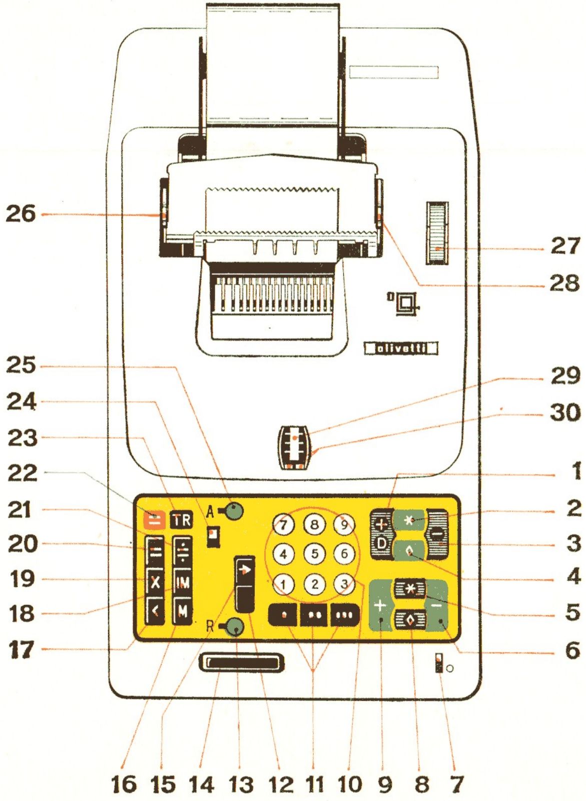
Enter number 3 and transfer it into the memory by depressing the multiplier key (**19**). Enter number 5 and depress key TR. The result of this multiplication is automatically transferred into the « memory ».

Enter number 6 and depress multiplication control key (**20**).

The machine performs the operation and prints the result if the automatic total lever (**25**) is still in operation. If on the contrary this lever is in rest position, to obtain the result of the operation it will be necessary to depress a total key (**5**) or (**8**) of the second register.

The transfer key for automatic re-entry of products is particularly useful when calculating volumes, etc.

Bear in mind also that by depressing key TR the product only is transferred into the memory even if the automatic register transfer key (**7**) is in operation.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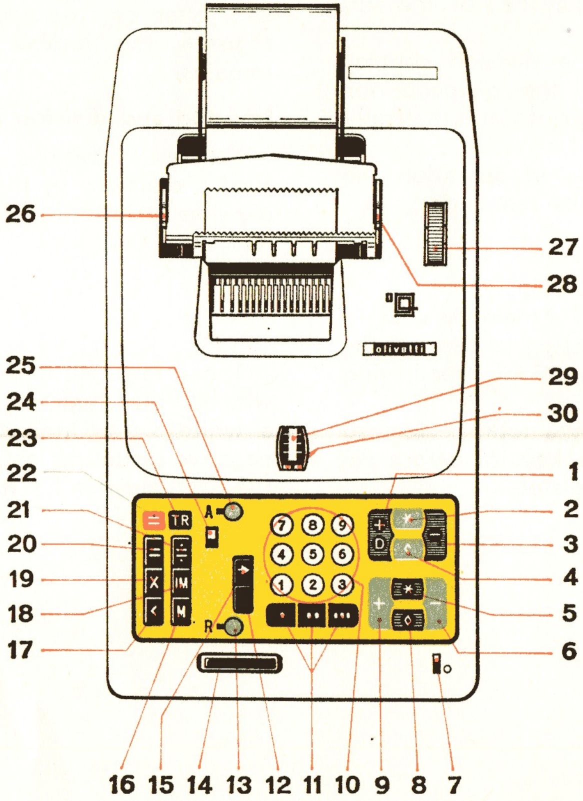
A
R
TR
IM
M
D
7 8 9
4 5 6
1 2 3
16 15 14 13 12 11 10 9 8 7


olivetti
TR
A
R
D
IM
M
16 15 14 13 12 11 10 9 8 7

Division.

Suppose now to make the following division:
325655 : 1254

Enter number 325655 and depress the add key of the second register and dividend entering key (**1**) or the add bar (**14**).

Enter number 1254 and depress the division control key (**21**). The machine writes again the dividend for control; performs the operation and prints automatically the quotient.

If the automatic total lever (**25**) is in operation the machine will also print automatically the remainder.

Memory input key (18).

The uses of the key IM are the following:

— when we want to put in either in « memory » or in registers the entered number it is sufficient to depress the desired key or keys of addition or subtraction, after having depressed key IM;

— whe we want to transfer in memory a total performed on a register it is sufficient to depress key IM before depressing a total key of the desired register.

Memory reading and out put key (16).

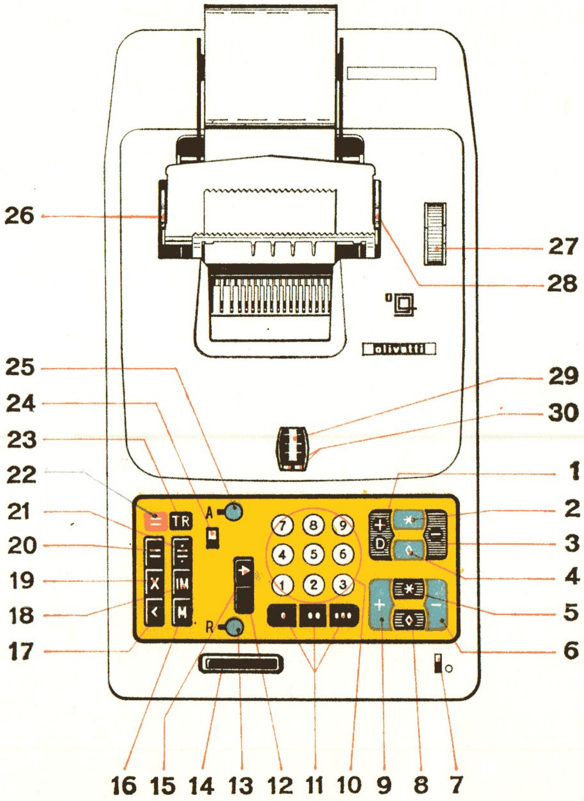
When key M and after on non-add key (**17**) are depressed it is possible to control the number put in « memory ».

When it is desired to transfer the number put in « memory » in one of the registers it is sufficient to depress key M and, after on, the add or subtraction key of the desired register. The number put in memory is not cleared, it remains.

Non-add and division stop key (17).

The key < besides its normal non-adding use, may also stop a division. In this case it is necessary to repeat the division because the results printed at the interruption have no value.

The « Tetractys » is equipped with a column indicator which shows how many digits have been entered; besides, a white signal indicates when the second register has a negative accumulation and a light blue signal indicates when the first register has a negative accumulation.


16 15 14 13 12 11 10 9 8 7
olivetti
A
R
TR
7 8 9
4 5 6
1 2 3
D

Operation

PART I - ADDITION AND SUBTRACTION

1) - Foreword

The figure illustrates the middle section of the machine.

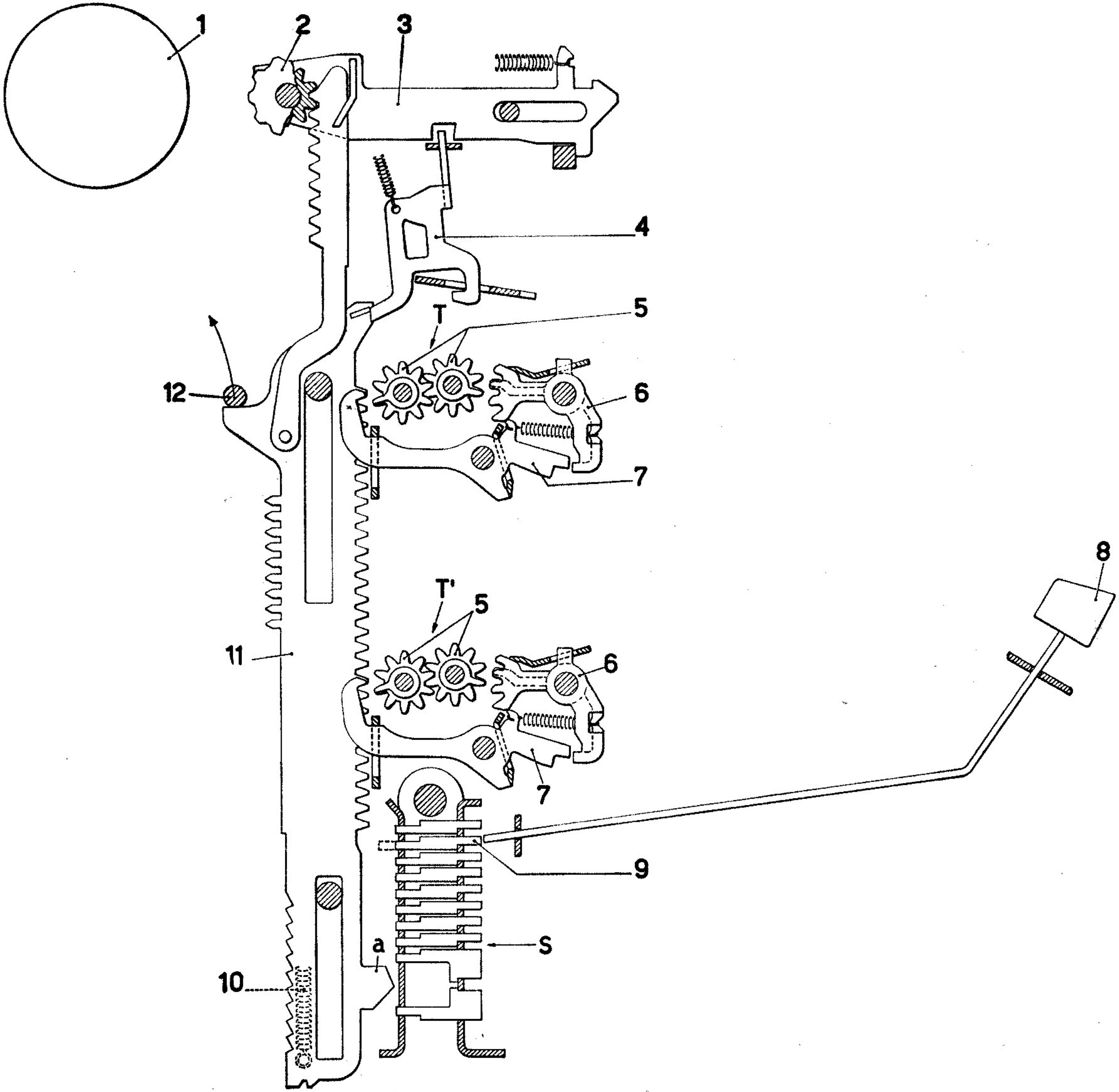
By pressing down a numeral key 8, a stop 9 of the entry slide **S** is moved leftward. When the universal bar 12 releases the rack 11, this latter is actuated upward by the spring 10 until it stops with the extension **a** against the stop 9. The rack moves therefore a number of steps equal to the value of the figure entered, rotating at the same time the corresponding types-carryng wheel 2 of an equal number of steps. The hook 4 now releases the slider 3 which compels the wheel 2 to print the figure entered on the platen 1. By engaging afterward one of the registers **T, T'** vith the rack 11 and by moving this latter back to rest, the wheels 5 of the register rotate a number of steps equal to the value of the figure entered.

Concluding, the figure entered has been printed on the papel-tape and added into the register.

The levers 7 and the sectors 6 are used to perform the transfer of the tens.

The Tetractys and the Divisumma 24 have the same structure but the Tetractys has two registers **T** and **T'** we shall call " second register " and " first register " **T**. Consequently all the parts concerning the " first register " are referred to the Tetractys exclusively, while the other parts concern both machines.

The Elettrosumma Duplex 24 is identical to the Tetractys as far as the adding and subtracting mechanisms illustrated in " Part I " are concerned bu it doesn't include those of the memory, multiplication and division illustrated in " Part II ".


T
T'
S
a

II - Entry.

a) *Keyboard and slide.*

The entry is introduced into the entry slide through the numeral keyboard.

The entry slide includes two parallel plates 13 and 16 carryng ten columns of stops. We find in each column starting from the bottom: one escapement stop 24, one cypher stop 27 and eight numeral stops 9 corresponding to the figures from one to eight. There is no stop for the nine on the slide. The racks 11 of the figure nine are stopped by the upper edge **b** of the comb 29 which guides them. All the stops of one column are held by a leaf spring 14.

The slide is also supplied with a toothed plate 28 placed at the left of the stops. When the slide is at rest the teeth of the plate 28 lock the racks 11 at zero; consequently this plate is nammed *cypher plate.*

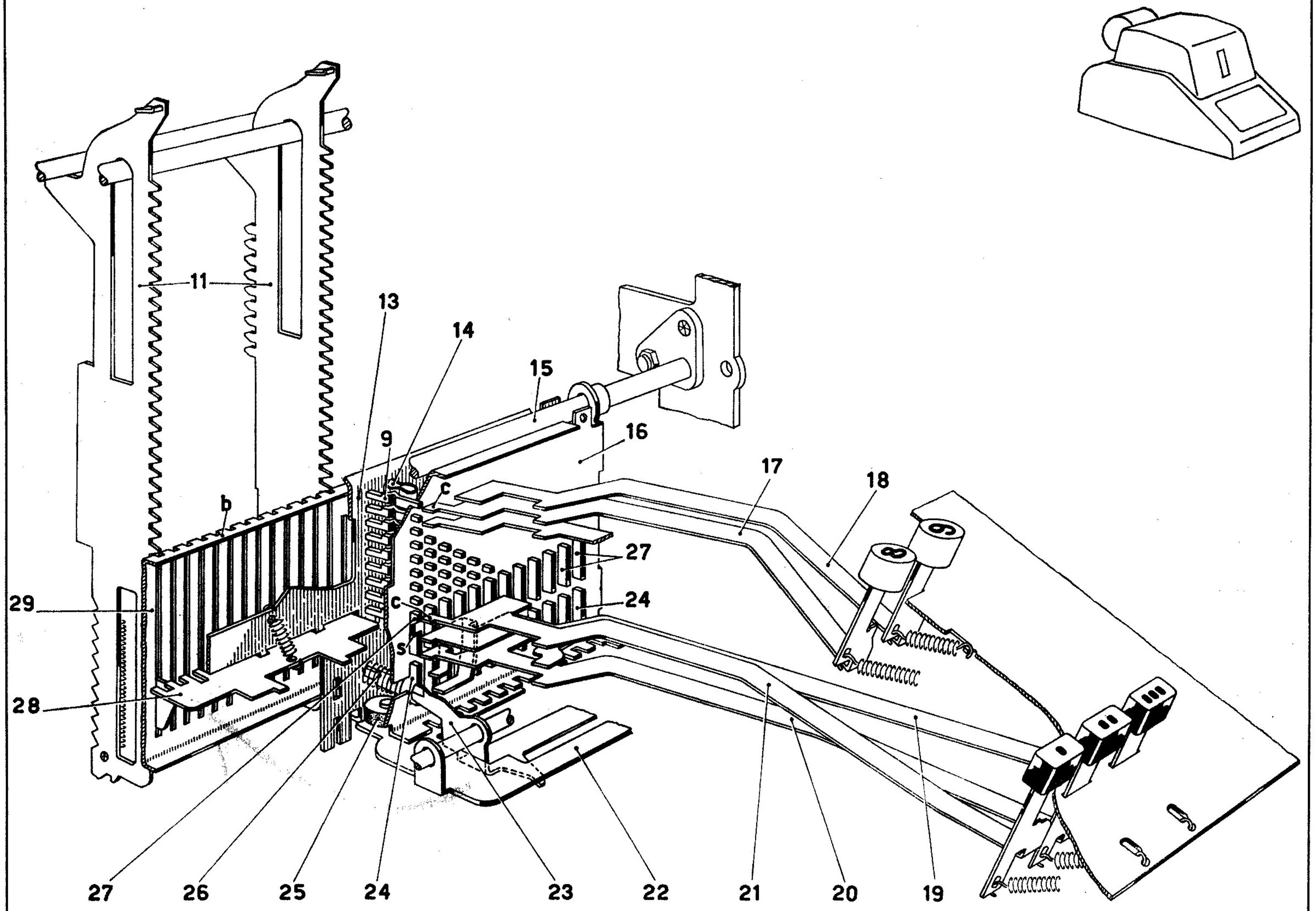
The slide runs transversally on the shaft 15 and on a roller 25 carried by the base plate 22 of the slide. At rest, it rests with the escapement stop 24 of the first column aginst the escapement tooth 23 as we shall better see in the next page.

The numeral keyboard has two groups of keys: the second the keys " 0 ", " 00 ", " 000 ".

Each key of the first group is fitted on a stem which, but the stem 18 of the nine, ends at the rear by a setting finger **c** (we have illustrated the stem 17 of the key eight only). The setting fingers **c** are aligned on one single vertical column, arranged from bottom to top according to the figures from one to eight; when the slide is at rest they are placed in front of the first left column of stops. By pressing down one of the keys from one to eight, the proper stem moves backward and sets, by means of its setting finger **c** (that is it moves backward), the corresponding numeral stop 9. The stem 18 of the key nine is not supplied with setting finger since it doesn't set numeral stops.

The numeral keys of the second group set the stops 27 of the zero. The finger **c** of the stem 21 of the key " 0 " is similar to that of the keys from one to eight and can set one stop 27 only; the finger of the stem 20 of the key " 00 " is larger and can set two consecutive stops 27; the finger of the stem 19 of the key " 000 " is still larger and can set three consecutive stops 27.

Please note that the stop 27 of the zero of the first column is different than the other stops 27. It is supplied with a slot **s** and cannot be set since it doesn't make sense setting a zero as the first figure of a number.


c
b
c
s

II - Entry.

b) *Escapement.*

To enter a figure it is necessary:

— setting the stop corresponding to the key depressed as seen before;

— moving the slide one step leftward to carry the stop set in front of the first right rack 11 of the units and moving the successive column of stops in front of the fingers **c**.

The stops 24 of the lower row are used exactly by the slide escapement that is by the mechanism which determines the step by step leftward of the slide after the entry of every digit.

The slide rests normally with the escapement stop 24 of the first left column against the escapement dog 23 actuated by the spring 36 of the slide transmission lever 35. The dog 23 rests at its turn against the left side of the slot **a** of the base plate 22.

Suppose the slide being at rest, that is resting with the first escapement stop 24 against the dog. 23. The first column of stops from the left is one step at the right of the units rack 11, and in front of the fingers **c**.

By pressing down one of the keys from one to nine the proper stem moves backward and while its finger **c** sets the corresponding numeral stop 9, its extension **d** drags the universal frame 33 backward. This frame sets the escapement stop 24 releasing it from the dog 23, releasing therefore the slide and rotates, in the direction of the arrow, the arm **e**, of the dog 37 also which then engages between the teeth **f** of the slide plate 16 (fig. 3). Then the slide makes a first short trip leftward and is stopped by the dog 37 while the dog 23 actuated by the spring 32 moves a little transversally toward the right and goes resting against the right side of the slot **a** of the plate 22 (fig. 4). This is why the dog 23 is called *movable dog* and the dog 37 *fixed dog.*

When the depressed key is left, the fixed dog 37 returns to rest leaving the teeth **f**; the slide makes another trip leftward, meets with the next escapement stop 24 (fig. 1) the movable dog 23, brings it back to lefst position and is stopped thus completing its one-step advance. Since the cypher plate 28 is integral with the slide, it releases now the first right rack 11 which thus rotates under the control of the stop 9 set. The setting concerning the next columns of the slide takes place similarly; remember that it is now possible depressing the key " 0 " also.

By pressing down the key " 00 ", while the universal frame 33 sets one escapement stop 24, the finger of the stem 20 (fig. 2) pushes bakward the next stop 24 also thus allowing the slide to advance by two steps. Similarly, in case of key " 000 " the finger of the stem 19 sets the next two stops 24 thus allowing the slide to advance by three steps.

c) *Column indicator.*

The leftward advance of the slide is transmitted to the lever 35 which trough the pinion 34 rotates the indicator drum 30. On this drum are painted columns of coloured dots and digits visible one by one through the opening **g** of the fixed support 31. After every entry the drum 30 shows therefore, through the opening **g**, a digit and a column of coloured dots thus indicating to the operator how many digits have been entered.

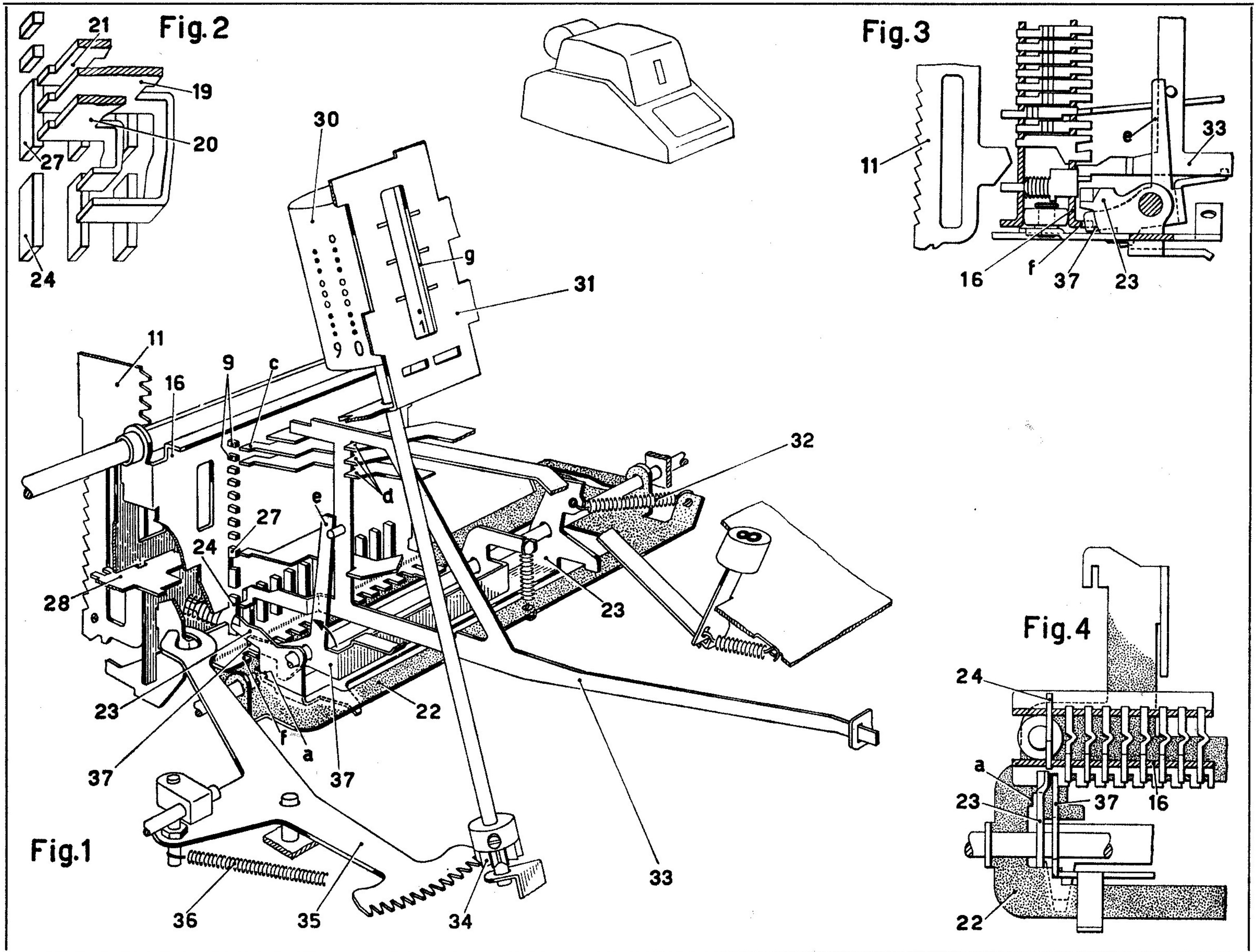


Fig. 2

Fig. 3

Fig. 1

Fig. 4

21
19
20
27
24
30
g
31
11
16
33
e
f
37
23
9
c
32
d
27
24
28
23
22
a
37
36
35
34
8
24
a
23
37
16
22

III - Registers.

a) *Structure of the registers.*

We have already said that the figures entered in the slide are accumulated in the wheels of the first or of the second register.

Each register has two sets of 13 wheels 5. Each wheel of one set engages constantly with the corresponding wheel of the other set. Each wheel has ten teeth; on the axial prolongation of one of them there is a transfer tooth **r**. Each pair of wheels corresponds to a precise figure; we have therefore the wheels of the units, those of the tens, etc... In the figure 1 we have illustrated the second register (the rack 11 is at "9") the first register is identical.

The two sets of register wheels 5 run on two parallel shafts fixed on two small side-plates 40. These latters are supplied ith a pivot 43, each one rotating in a slider 42. By means of the sliders 43, the register can be moved backward to engage with the racks 11 (chap. IV) and forward to engage with the transmission sectors 6 (chap. V).

The register can also rotate by 180° on the pivots 43 to engage with the racks 11 one of the two sets of wheels 5. The wheel of a set are called *adding wheels* because they engage with the racks 11 in addition and will be identified by "A"; the wheels of the other set are called *subtracting wheels* because they engage with the racks 11 in subtraction (chap. VII) and will me identified by "S".

b) *Locating and locking the registers.*

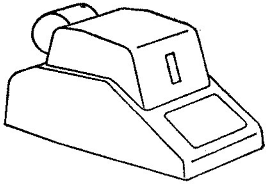
On the left slider 42 of each register runs the small plate 45 which, actuated by the spring **s**, rotates the cam 44 fixed on pivot 43 in the direction of the arrow. The small sideplates 40 of the register are therefore resting with the surface **a** against the shouldering **b** of the small fixed blocks 38 (fig. 2). If the register is rotated by 180°, the cam (fig. 1) is in high position and is pushed by the small plate 45 in the direction opposite to that of the arrow. In this case, the small sideplates 40 of the register are resting with the surface **c** (fig. 2) against the shouldering **d** of the small fixed blocks 38.

When the register engages with the racks 11 the extensions **e** of the small side-plates 40 of the register mesh with the guides **f** of the small fixed block 38 holding the register still. Wren the register engages with the transmission sectors 6, the extensions **g** of the small side-plates mesh with similar guides **h** of the smalla fixed blocks. If the register is rotated by 180° during the engagement with the racks 11 the extensions **g** mesh with the guides **f**, vhile during the engagement with the sectors 6 the extensions **e** mesh with the guides **h**.

c) *Unlocking the register wheels.*

When a register is disengaged from the racks 11 and from the transmission sectors 6 as illustrated in the figure, the wheels 5 are locked by the small bar 39 which follows the rotation of the register.

When a register moves toward the racks 11 or toward the sectors 6, the two levers 41 cannot follow completely the motion of the small side-plates 40 of the register because they stop against the shouldering **m**, or **n**, of the small blocks 38. The levers 41 rotate therefore in the direction of the arrow and the prosper slot **p** removes the small bar 39 from the wheels 5 thus unlockings the register.



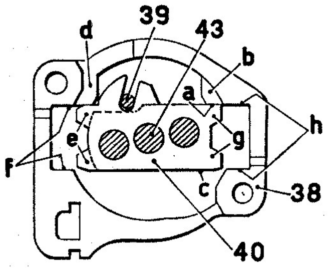

d
39
43
b
a
h
f
e
g
c
38
40

Fig.2

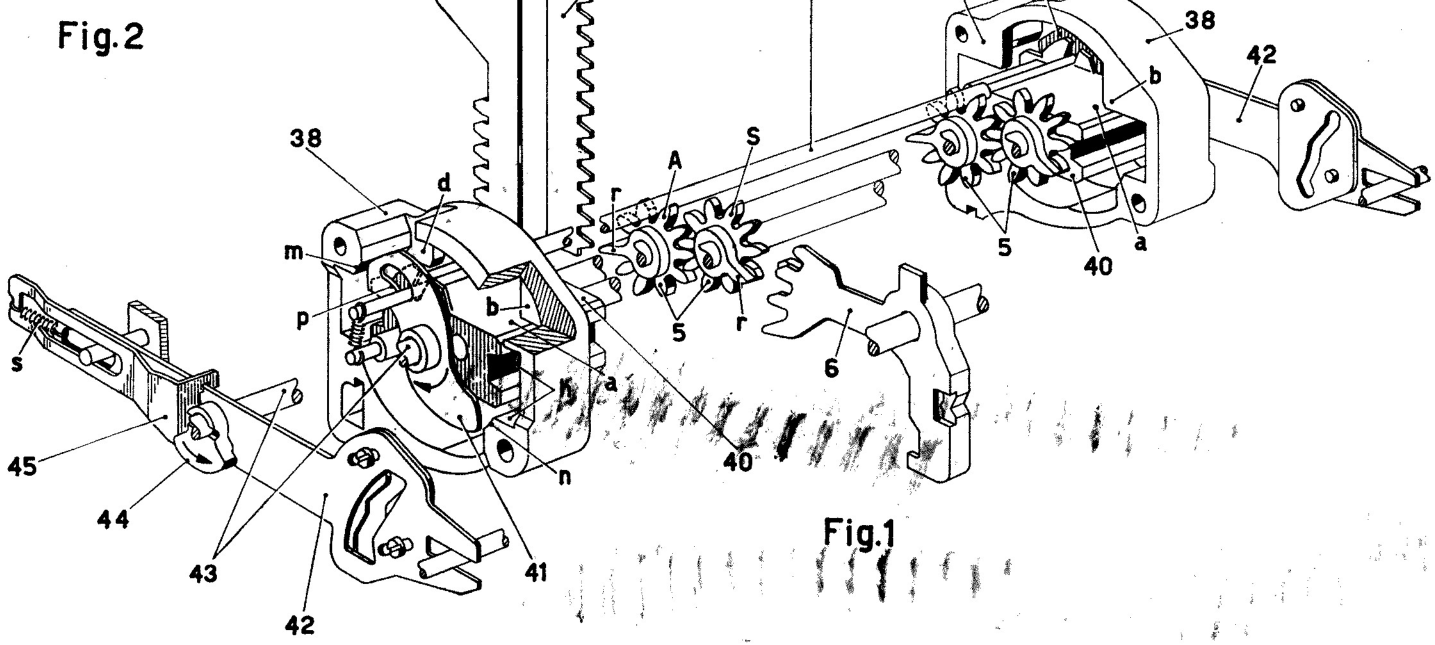

11
39
d
41
38
42
b
38
A
S
r
d
m
p
b
a
5
r
6
5
40
a
s
45
44
43
42
41
n
40

Fig.1

IV - Execution.

The execution is the process by which a figure entered in the slide is accumulated in addition or in subtraction in a register. This accumulation is performed by the racks 11 which are therefore called *executers.*

The executers 11 are usually held at zero resting against the fixed shaft 48 by means of the universal bar 12. This bar is fitted in the slots **b** of the bridge 46 set on the shaft 49 and is pushed down by the slots **b** of the leaf spring 47 which assures the flexible support of the executers 11 against the shaft 48.

At each rotation of the main shaft 53 the two cams 51 and 52 with complementary profile push the connecting-rod 50 first downward and then upward. The shaft 49 and therefore the bridge 46 also oscillate first in the direction of the arrow **A** and then in the direction of the arrow **R**; the universal bar 12 first rises and then falls down.

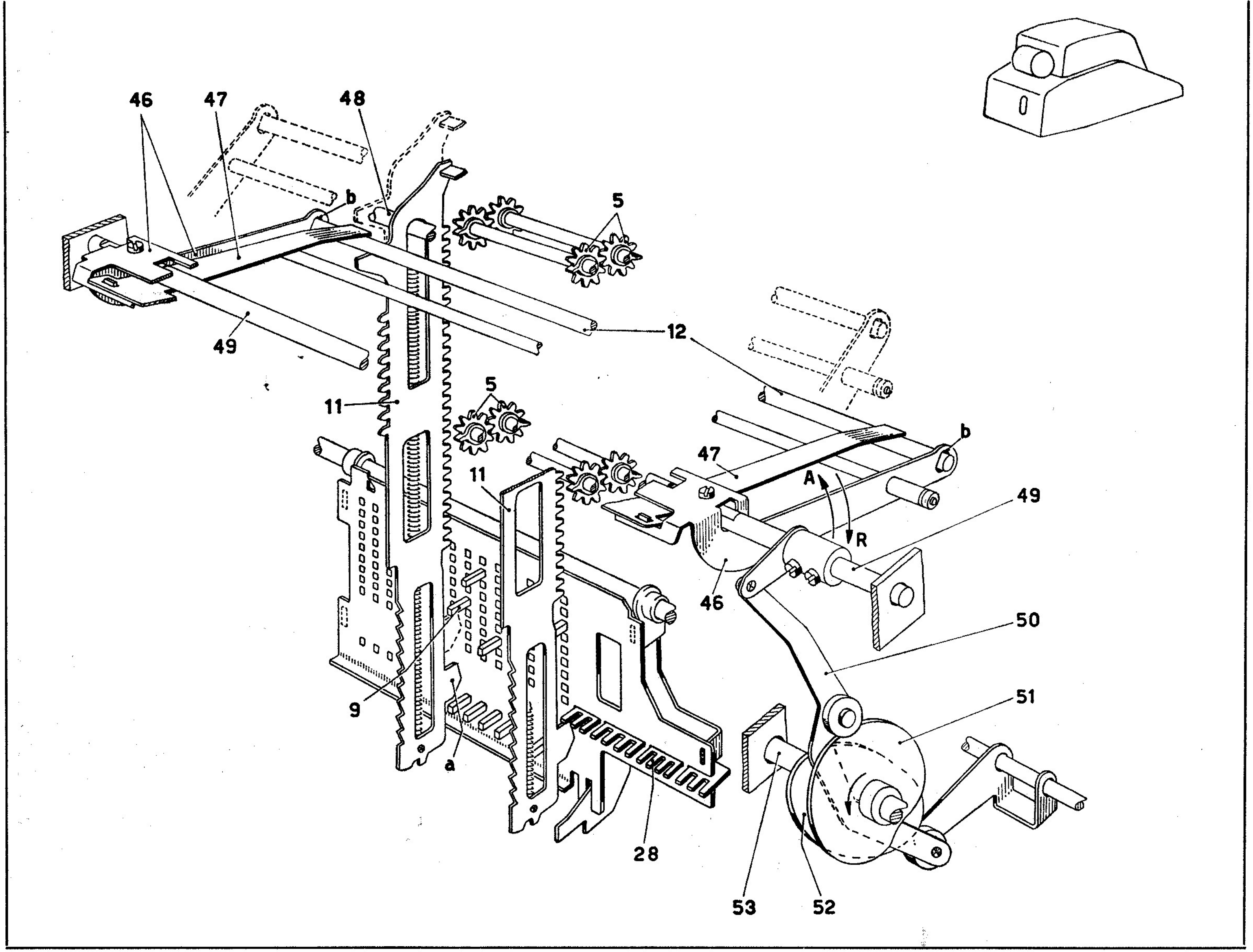
We shall illustrate the execution concerning the addition; that concerning the subtraction is identical and will be better explained at chap. VII.

To add a figure entered in the keyboard into a register, press down the proper adding key which compels the machine to perform a cycle during which the main shaft 53 makes a complete rotation (chap. XVI, par. *a*).

At 25° of rotation of the main shaft 53, the universal bar 12 start raising followed by the executers 11. At 140° the universal bar 12 has performad the maximum useful-travel (hachured position in the figure). The executers 11 have stopped one by one with the lug **a** against the stops 9 set (hachured position); those at the left of the first figure set (at the right in the figure) are on the contrary stopped by the teeth of the cypher plate 28. At 134° the printing mechanism is also controlled to print on the paper the figure entered in the machine (chap. IX).

At 170° of the cycle, the register choosen engages with the executers 11 (chap. VI). At 180° the universal bar 12 starts falling down and restoring the executers 11. The executers 11 which had moved beyond the position zero then rotate each the proper register wheel 5 a number of steps equal to the figure set in the proper column.

Ah 250° the executers 11 have returned to the position zero (position illustrated in the figure). At 260° the register is disengaged from the executers 11, the transfer of the tens takes place (chap V) and the entry slide moves to rest position thus clearing the entry (chap. XII).


b
b
A
R
a

V - Transmission of the tens.

a) *Foreword.*

Every time a register wheel completes a rotation the wheel of the figure immediately higher should advance of one step to perform the transfer of the ten. A register wheel can complete the rotation during the execution that is during the engagement with the executers, then performing a *primary* transfer. Or else it can complete the rotation because of another transfer then performing a *secondary* transfer.

The transfer of the tens is performed during the second part of the cycle after the register has been disengaged from the executers. Since the action is similar for both registers we shall illustrate the second register transfer only. In the fig. 1 we have illustrated the register wheel concerning two consecutive figures. The register is in adding position; we shall therefore describe the transfers of the tens during addition. Those made during a subtraction are similar but with the register being first rotated by 180° (chap. VII).

b) *Primary transfers.*

For every figure of the register there is a transfer lever 7 (fig. 1) running on a shaft 59. When at rest, the lever 7 rests against a fixed comb 57 actuated by the spring 58 hooked between this lever and the transmission sector 6. This latter rests (when at rest) against the comb 56 and its teeth are on the plane of the pair of wheels of the figure immediately higher.

At 160° of the cycle, the cam 65 of the main shaft 53 allows the lever 64 rotating in the direction of the arrow. The pin **a** of the lever 64 allows the arm 63 rotating in the direction of the arrow thus dragging down the stay 61. This stay rotates in the direction of the arrow the shaft 54 together with the comb 56 which releases the sectors 6. These move to rest with their stem **c** of the corresponding levers 7 (fig. 2). Furthermore the pin **a** is followed by the arm **c** of the lever 62 which rotates in the direction by the arrow pushing the rod 60 upward and rotating the comb 55 fixed on the shaft 59. The arm **d** of the lever 62 can be pushed by the pin **a** when the lever is idle.

When a register wheel, the vheel **A**, for instance (fig. 1), advances during the execution from the 9th to the 10th step, its transfer tooth **r** lowers the end **f** of the lever 7 which thus rotates arround the axle 59. The lever 7 then releases the sector 6 which moves to the position illustrated in the fig. 3.

At 285° of the cycle, the register is moved forward so that the wheels **S** engage with the sectors 6 (chap. VI). Precisely the wheel **S**$_2$ of the figure following that of the wheel **A**$_1$ (fig. 1) engages with the sector 6 which has been released (fig. 4). At 300° of the cycle, the cam 65 (fig. 1) rotates the lever 64 in the direction opposite to that of the arrow thus moving, through the pin **a** and the arm 63, the stay 61 upward. The comb 56 then returns to the position illustrated in the figure 1 bringing back at the same time to rest all the sectors 6 which had been released. The sector 6 (fig. 4) rotates therefore by one step the corresponding wheel **S**$_2$ **thus making the primary** transfer.

The sector 6 by rotating gets released from the lever 7 which can return to rest actuated by the spring 58; consequently the restoring of the transfers takes place as they are performed. Furthermore the pin **a** of the lever 64 actuates the extension **c** and rotates the lever 62, in the direction opposite to that of the arrow. This lever is followed by the rod 60 which moves the comb 55 back to rest. The comb. 55 then actuates the extension **g** of the levers 7 confirming, in this way, the restoring of the transfers. At 340° of the cycle, the register is disengaged from the sectors 6 (chap. VI).

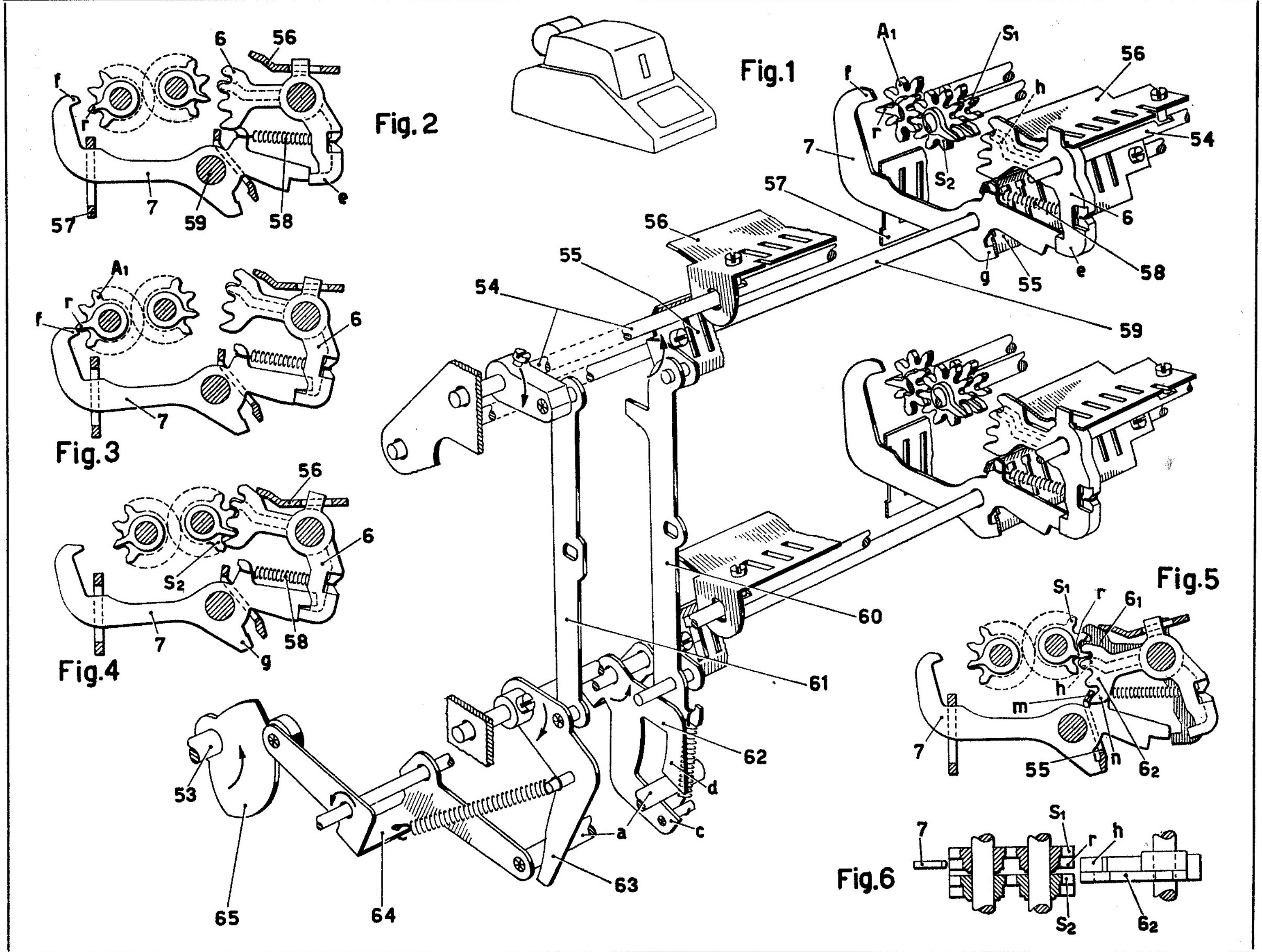


Fig. 2

Fig. 3

Fig. 4

Fig. 1

Fig. 5

Fig. 6

6
56
f
r
57
7
59
58
e
A₁
r
f
6
7
56
6
S_2
58
7
g
A_1
S_1
56
f
h
r
7
54
S_2
57
6
58
e
55
g
59
56
55
54
60
61
62
d
c
a
63
64
65
53
S_1
r
6_1
h
m
7
55
n
6_2
7
S_1
r
h
S_2
6_2

c) *Secondary transfers.*

Each sector 6 is supplied with a lateral tooth **h** (figures 1-6) which is placed on the plane of the transfer tooth of the wheel **S** placed on the plane of the corresponding lever 7.

Suppose now the sector 6 being in the rest position illustated in the figure 1. If, during the engagement of the register with the sectors 6, the wheel $\mathbf{S}_1$ (figures 5 and 6) moves from nine to zero, its transfer tooth **r** meets vith the tooth **h** of the sector 6_2 of the figure immediately higher and drags it to the position shown in the figure 5. The wheel $\mathbf{S}_2$ engaging with this sector adavances at its turn by one step thus accumulating the unit of the secondary transfer. Naturally the secondary transfer is performed contemporaneously with the transfer that has caused it, which can be a primary or a secondary transfer.

When at 300° of the cycle, the comb 55 is brought back to rest, its bent edge **m** (fig. 5) engages with the tooth **n** of the sectors 6 that have performed a secondary transfer preventing them returning to rest position when the register gets disengaged. The sectors 6 which are in this position shall return to rest at 160° about of the successive cycle when the comb 55 is rotated again.

By hooking the tooh **n**, the comb 55 should also align all the sectors 6 moved to the position illustrated in the figure 5 and correct the little misadjustment caused by the plays between one register wheel and the following. This is very important in case the secondary transfer takes place in a set of successive orders.

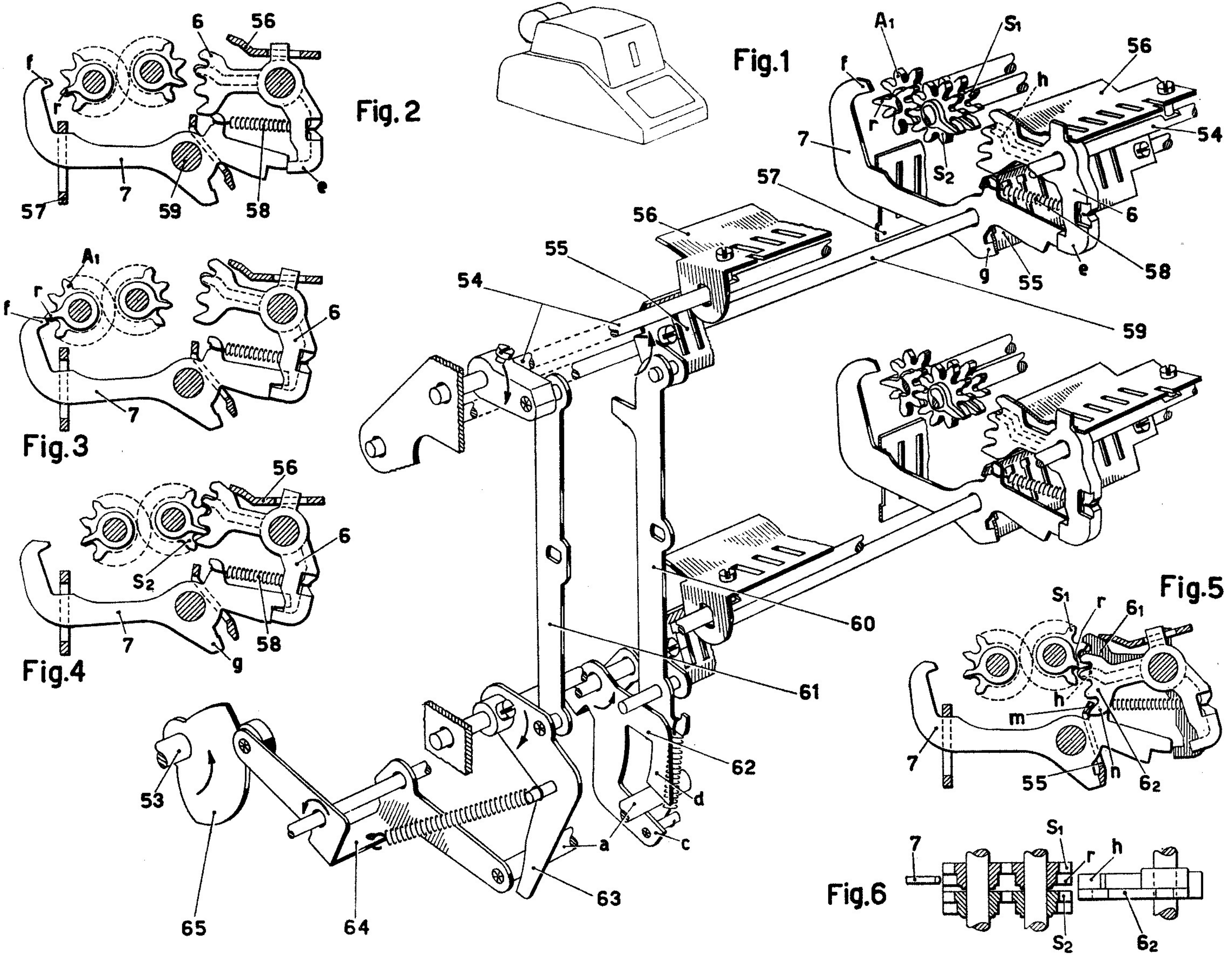


Fig.1

Fig. 2

Fig.3

Fig.4

Fig.5

Fig.6

f
r
6
56
57
7
59
58
e
A₁
r
f
6
7
56
6
S₂
7
58
g
A₁
S₁
56
f
h
r
7
54
S₂
57
6
55
56
g
55
e
58
59
54
60
61
62
d
53
a
c
65
64
63
S₁
r
6₁
h
m
7
55
n
6₂
7
S₁
h
r
S₂
6₂

VI - Engagement and disengagement of the registers during calculation.

During a calculation cycle the register actuated moves first backward to engage with the executers, then forward to engage with the transfer sectors and it returns afterward to the central rest position.

a) *Presetting the second register.*

By rotating the axle 85 in the direction of the arrow the pins **a** of the two levers 79 and 87 fixed on the axle 85 actuate the cam-slots **b** of the small plates 88 adjustable on the sliders 42 and push theje latters as well as the register backward; by rotating the axle 85 counter-wise the register is pushed forward. The register is held every time in the position reached by the spring-stabilizer 86 which locks the lever 87. The rotation of the axle 85 is preset by the depressed key and is performed by the two control plates 66 and 67 which are actuated by the cams 90 and 89 of the main shaft 53 and which actuate also the two pins **c** and **d** of the connecting-rod 73 pivoted on lever 79.

By pressing down the second register add key 77, the pin **e** moves the clutch release slider 78 forward thus starting the cycle (chap. XVI) and stops on the trajectory of the step **f** of the engagement control slider 74. This latter is pivoted on the bridge 70 which is connected through the stay 72 to the connecting-rod 73 and also, through the spring 71 to the slider 69. When at rest, the slider 74 rests against a wing of the crank 75.

We have seen at chap. IV that during a cycle the shaft 49 oscillates first in the direction of the arrow **A** and then in the direction of the arrow **B**. The small plate 68 fixed on the shaft 49 actuates first the step **g** pushing the slider 69 forward. The latter is followed by the slider 74 until the step **f** stops against the pin **e**. At 180° of the cycle, the shaft 49 starts rotating in the direction of the arrow R and moves the slider 69 as well as the slider 74 back to rest.

During the motion of the slider 74, the connecting-rod 72 first falls down and then moves upward together with the pins **c** and **d**. In the calculation cycles, as we shall see better at par. *d*, the pin **c** cannot return immediately to rest because it engages under the extension **h** of the plate 66. The slider 69 and the slider 74 follow the plate 68 only when the extension **h** releases the pin **c**.

As we shall see better at par. *d*, this vertical movement of the pins **c** and **d** is synchronized with the movement of the plates 66 and 67 so that:

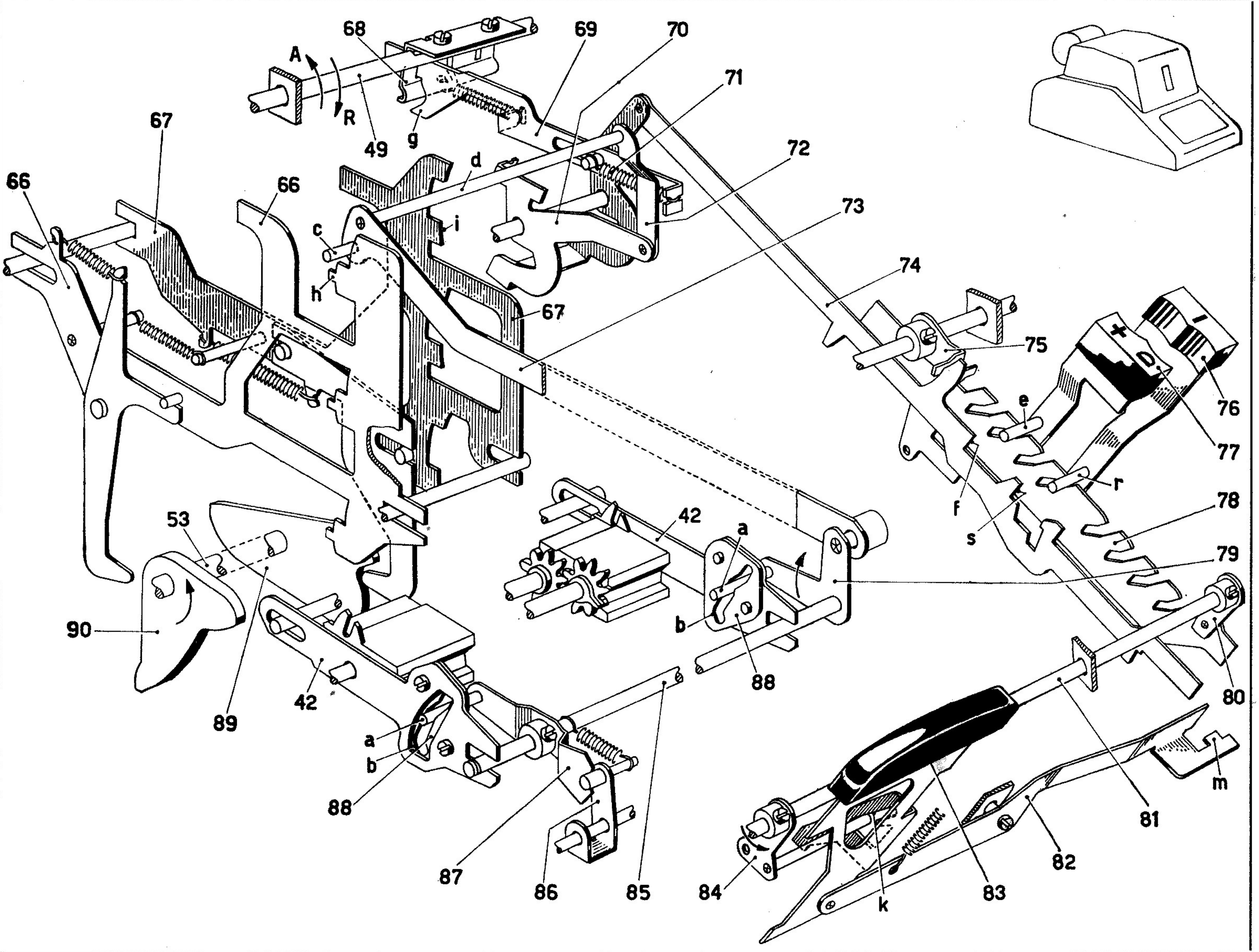
— at 170° of the cycle, the pin **d** moves in front the extension **i** of the plate 67 which pushes the connecting-rod 73 forward thus engaging the register with the executers;

— between 255° and 285° of the cycle, the plate 66 pushes the connecting-rod 73 backward thus disengaging the register from the executer and engaging it with the transmission sectors;

— at 330° of the cycle the plate 67 moves the connecting-rod 73 back to rest thus disengaging the register from the transmission sectors.

The addition can be controlled in the second register by the key 77 and also by the front key 83. By pressing down this key, its slot **k** rotales the crank 84 in the direction of the arrow which, through the shaft 81, the crank 80 and the slider 78 starts the cycle (chap. XVI). The key 83 rotates also the transversal lever 82 which moves its wing **m** on the trajectory of the end of slider 74, stopping therefore this latter in the same position where it is stopped by the pin **e** of key 77.

The subtraction key 76 presets the engagement of the register in the same way as the add key 77. By pressing down the key 76 its pin **r** moves the clutch release slider 78 forward (chap. XVI) and stops the step **a** of the slider 74 after a travel of this latter shorter than in case of addition but such to syncronize the vertical movement of the pins **c** and **d** with the movements of the plates 66 and 67 as for the addition.


A
R
g
d
c
i
h
+
I
D
e
r
f
s
a
b
a
b
m
k

VI - Engagement and disengagement of the registers during calculation.

b) *Presetting the first register.*

The engagement and the disengagement of the first register is preset in the same way we have seen for the second register and are still controlled by the plates 66 and 67 actuated by the keys 94 and 93 of the engagement control slider 92 which is connected to the connecting-rod 93 of the first register by means of the bridge 91. The other parts of the first register engagement device are identified in the figure by the same references used for similar parts of the second register; consequently the description is made in the precedent page is worth for first register also.

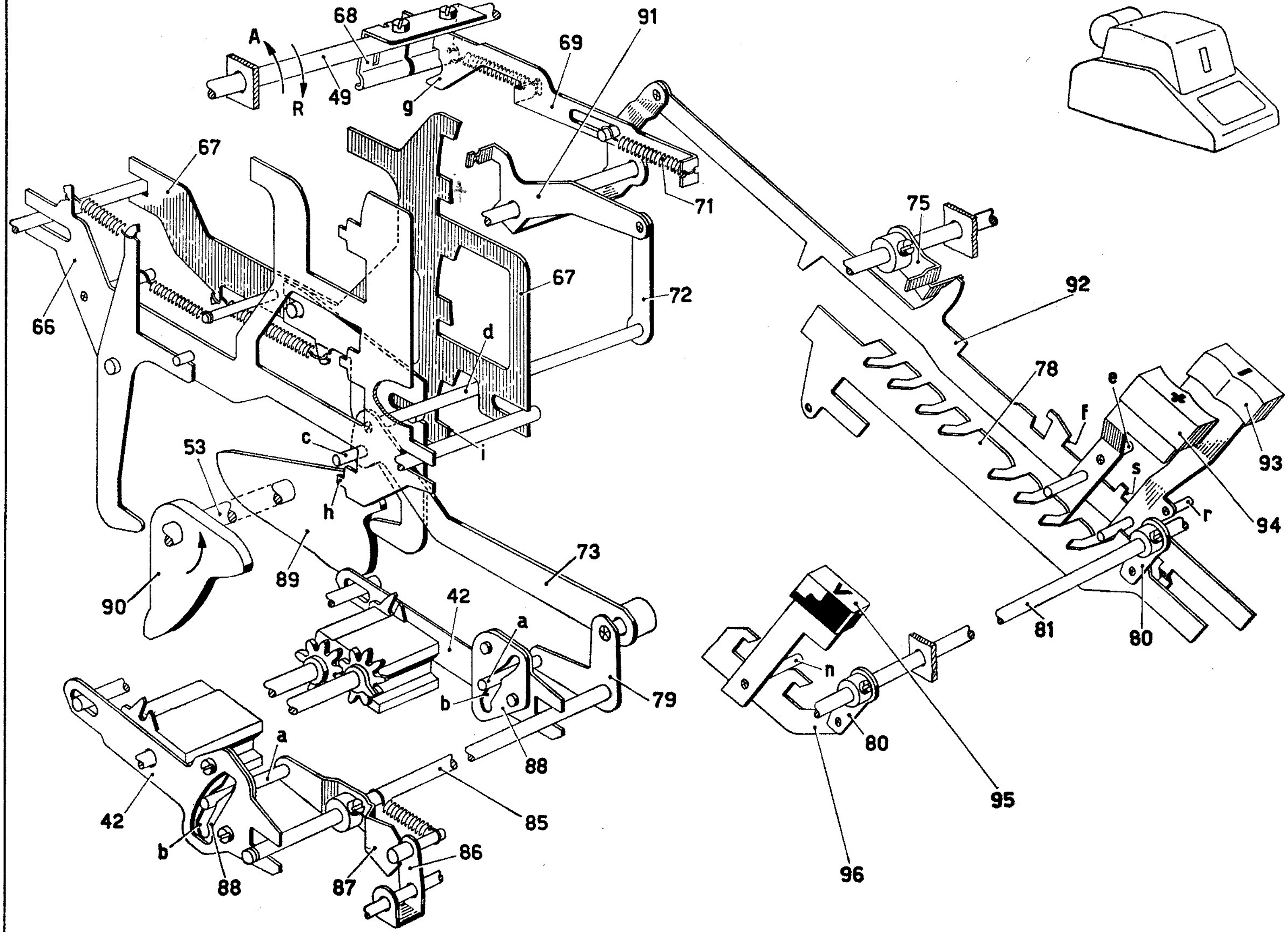
c) *Non-add.*

If during a cycle we don't actuate a register, that is if neither the add key nor the subtraction key are depressed no stop is placed on the trajectory of the proper engagement control slider (74 for second register, par. *a*, and 92 for first register).

This slider can now make during the cycle its full forward, travel carryng the pin **d** under the extension **i** of the plate 67 which cannot therefore move forward. The proper register is therefore engaged neither with the executers nor with the transmission sectors and the cycle is a *non-add* one this register.

By pressing down the non-add key 95, its pin **n** moves the slider 96 forward; this latter, through the two cranks 80 and the shaft 81, moves the clutch release slider 78 forward thus releasing a cycle (chap. XVI).

Since the key 95 stops neither the slider 74 of the second register (par. *a*) nor the slider 92 of the first register, no register will engage with the executers and the cycle will be a *non-add* one for both registers.


A
R
g
d
e
f
c
i
s
r
h
a
b
n
a
b

VI - Engagement and disengagement of the registers during calculation.

d) *Engagement and disengagement control.*

The plate 66 is actuated by the cam 90 of the main shaft 53, through the lever 99 pivoted on it and the spring 100 set between the latter and the plate 66. The plate 67 is actuated by the cam 89 through the lever 97 and the spring 98 set between the latter and the plate 67. We shall illustrate here these movements during an adding or subtracting cycle. We have choosen the first register; the second register is actuated in the same way.

At the beginning of an adding or subtracting cycle, the lobe **c** of the cam 89 moves the plate 67 forward (fig. 2). Since the pin **d** of the connecting-rod 73 has not moved yet downward (par. *a*) and is still in front of the opening **f** of the plate 67, this latter cannot move the pin **d**. The plate 67 remains therefore still.

At the end of the forward travel of the executers, the pin **d** has moved on the trajectory of the extension **i** of the plate 67 and the pin **c** under the extension **h** of the plate 66 as illustrated in the fig. 3. The pins **c** and **d** have therefore covered the segment **AB**.

At 170° of the cycle, the lobe **m** of the cam 89 (fig. 1) moves once more the plate 67 which, through the extension **i** and the pin **d**, pushes the connecting-rod 73 forward, thus moving the register backward and engaging it therefore with the executers. The pins **c** and **d** have now covered the segment **BC** (fig. 4). Immediately after the connecting-rod 73 is pushed forward, the lobe **n** of the cam 90 (fig. 1) moves the plate 66 backward. This last movement remains without effect because the pin **c** has been carried under the extension **h**.

As we have seen at par. *a*, at 180° of the cycle, the pins **c** and **d** start moving upward. Yet they are stopped immediately because the pin **c**, which has moved forward with the connecting-rod 73, engages under the extension **h** of the plate 66 (fig. 5). The pins **c** and **d** cover therefore the segment **CD**.

At 255° about, the lobe **p**, of the cam 90 (fig. 1) starts moving again backard the plate 66 which, through the pin **c**, drags now the connecting-rod 73 backward; consequently, the pins **c** and **d** cover the segment **DE** (fig. 5). The register is therefore actuated forward (see par. *a*) and is first disengaged from the executers and then engaged with the transmission sectors. This engagement is completed at 285° of the cycle.

The plate 66 now returns to rest thus releasing from the extension **h** the pin **c** which together with the pin **d** can return to rest covering the segment **EF** (fig. 6). The pin **d** moves again in front of the opening **f** in the position **F** which is displaced toward the rear with respect to the starting position **A**.

At 330° of the cycle, the lobe **q** of the cam 89 (fig. 1) pushes once more the plate 67 forward; the plate drags with the opening **f** the pin **g** making it covering the segment **FA** and moving the connecting-rod 73 back to the central rest position. The register is therefore disengaged from the transmission sectors and returns to starting position.

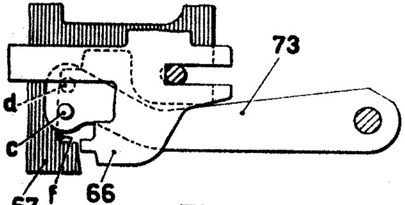


Fig. 2

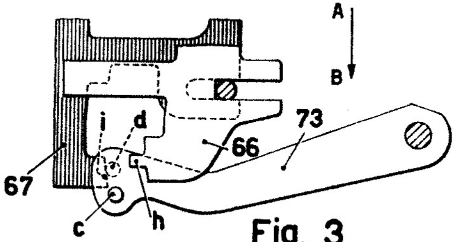

A
B
i
d
73
66
67
c
h

Fig. 3

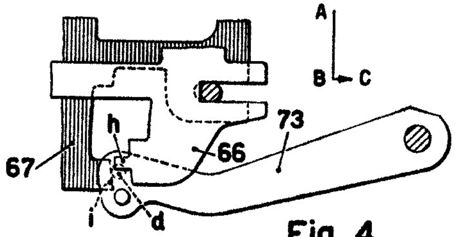

A
B
C
h
73
67
66
i
d

Fig. 4

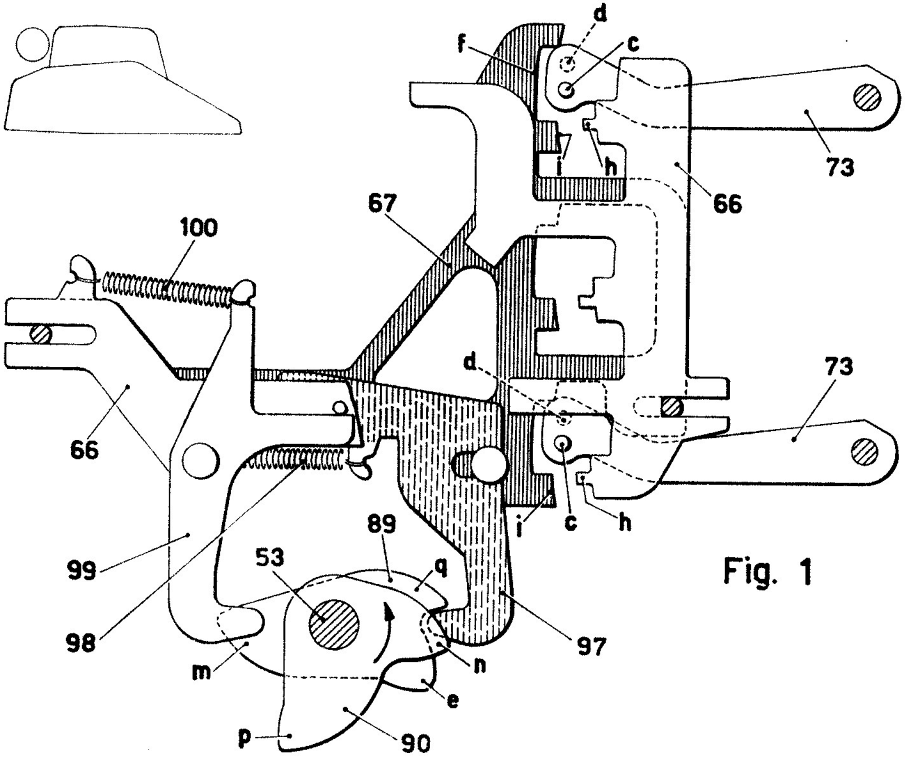

d
f
c
73
i
h
66
67
100
73
d
66
i
c
h
89
99
53
q
98
97
m
n
e
p
90

Fig. 1

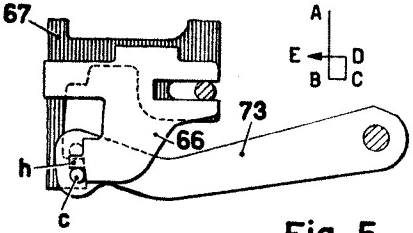

67
A
E
D
B
C
73
66
h
c

Fig. 5

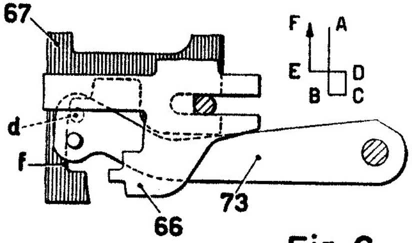

67
F
A
E
D
B
C
d
f
73
66

Fig. 6

VII - Inversion of the registers during calculation.

a) *Foreword.*

In the subtraction, the register wheels must turn in the direction opposite to that of the addition. This is obtained by rotating the register by 180° (chap. IV), to engage the wheels **S** with the executers and the wheels **A** vith the transmission sectors. The subtraction differs from the addition only by the reversed position of the register. Naturally the inversion must take place before the engagement of the register, every time its position doesn't correspond to that of the operation to be performed.

At every cycle of the machine, as we have seen at Chap. IV, the shaft 49 together with the bridge 46 rotates first in the direction of the arrow **A** and then in the direction of the arrow **R**. During the rotation **A**, the roller **a** carried by the axle 101 of the bridge 46 actuates the skid **b** and moves backward the plate 111 which then returns to rest thanks to ist spring. The plate 111 carries two vertical axles 110 on which runs two anchors 103 and 108 each one suplied with two teeth-range **c** and **d**. On the pivot 43 of the second register is fitted the pinion 102 placed between the teeth-ranges **c** and **d** of the anchor 103. On the pivot 43 of the first register is fitted the pinion 109 placed between the theeth-ranges **c** and **d** of the anchor 108. In the figure 1, both registers are illustrated in adding position where the teeth-range **d** of both anchors lays aside of the proper pinion. The theeth-range **c** of both anchors doesn't engage with the pinions because the latters have the tooth **e** laying aside axially with respect to the other teeth and therefore with respect of the teeth-range **c**; consequently, in the adding cycles the movement of the plate 111 doesn't interest the registers.

b) *Second register.*

By depressing the subtraction key 76 of the second register the lever 105 is rotated in the direction of the arrow. The arm 104 integral with the lever 105 and connected by pivot and slot to the anchor 103, moves this latter to high position engaging the teeth-range **d** with the pinion 102 (fig. 2).

In the first part of the cycle, the anchor 103, by moving backward together with the plate 111, rotates by 180° the pinion 102 thus performing the inversion of the second register from adding to subtracting position. This rotation is completed toward the end of the travel made by the anchor, by the wing **f** which pushes if necessary the tooth **e** (fig. 1) and prevents the rebounding of the register. Furthermore, because the tooth **e** doesn't interfere with the teeth-range **d**, the anchor 103 can move back to rest together with the plate 111 independently from the register which remains in the position reached (fig. 3). At the end of the cycle, with the key 76 also returning to rest, the anchor 103 returns to the low position illustrated in the fig. 1.

If the following cycles are still of subtraction, the anchor 103 is always moved back to the high position (figure 3) and its motion doesn't interest the pinion 102. Yet if in a cycle the key 76 is not depressed and if an adding cycle is started on the second register, the anchor 103 remains in low position; the teeth-range **c** engages therefore with the pinion 102 thus performing the inversion of the second register from subtracting to adding position (see fig. 1). The wing **g** of the anchor 103, by acting on the tooth **e**, completes the rotation of the pinion 102 as it could be done by the wing **f**.

c) *First register.*

The inversion of the register is performed in the same way. By depressing the key 93 we rotate in the direction of the arrow the lever 106 which, through the arm 107, moves the anchor 108 to high position tus engaging its teeth-range **d** with the pinion 109 of the first register which is reversed by 180°.

The first register can move back to rest position during a cycle in which the anchor 108 remains in low position and the teeth-range **c** engages with the pinion 109.

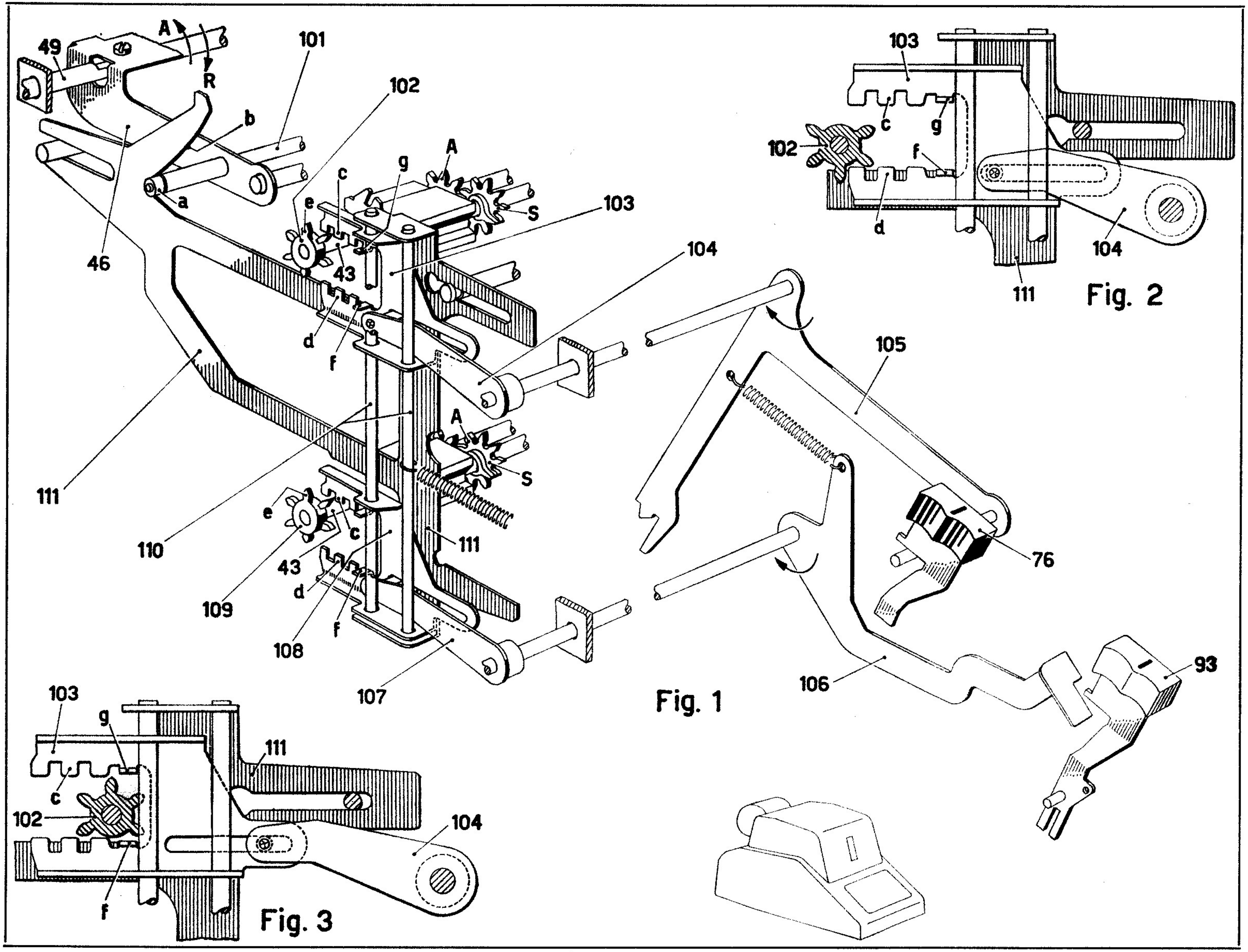

49
A
R
101
102
103
b
a
46
c
g
e
43
d
f
A
S
104
111
110
109
108
107
105
76
106
93
103
c
g
102
f
d
104
111
103
g
111
c
102
104
f

Fig. 1

Fig. 2

Fig. 3

VIII - Credit Balance.

So that a register might give the correct total automatically, whatever the sign of the balance, it should be fitted with the two following mechanisms:
— circular transmission,
— balance sign indicator.

In the Mc 24 both registers are supplied with the two abow mechanisms.

a) *Circular transmission.*

With the register at zero or in adding position, the transfer tooth **r** (figures 1 and 2) of the adding wheel **A** is placed immediately under the end **f** of the lever 7 of the tens (Chap. V). The transfer tooth **r** of the substracting wheel **S** is not diametrically opposite to that of the wheel **A** but displaced by one step. That is, if the adding wheel is at "0" and we reverse the register by 180° to engage the subtracting wheels with the executers, the adding wheel will be placed at "9", with the transfer tooth immediately above the end **f** of the lever 7. If the adding wheel is for instance at "3", by upturning the register the subtracting wheel will be at "6". Concluding, we can say that the wheels are adjusted in such a way to have on one of them always the *complement to nine* of the other.

Suppose now having the register at zero and to subtract a unit. The executer of the units rotates by one step the corresponding wheel **S**; this latter moves to zero and controls the transmission of one unit to the wheel of the tens. This wheel, when receiving the transmission, will move from nine to zero and make a transmission on the wheel of the hundreds and so on until the last wheel of the register is actuated; in this way, all the wheels **S** move to the position zero. Yet, since the exact result is one, it is necessary still adddings "1" to the wheels of the units. This is done by making in the wheel of the units a transmission from the last wheel, that is by performing the *circular transmission.* The exact result is therefore found in the wheels **S** if the total is negative, while it is found in the wheels **A** if the total is positive.

The operation is performed as illustrated in the figures from 3 to 6. In the upper row **U** are shown the wheels of the units; in the lower row **D** the wheels of the tens. In the figure 3 the register is at zero. In the figure 4 the register has been upturned by 180°; the substracting wheels are at "9". In the figure 5 we have subtracted "1" and the subtracting wheel of the units has moved to "0" controlling the transmission of one unit to the wheel of the tens. In the figure 6 the circulartransmission has been performed; consequently, the wheel of the units advances from the position "0" to the position "1" thus giving the exact result.

It is easy to understand that the circular transmission is necessary every time the balance sign changes, that is when the result of the operations passes from the wheels **A** to the wheels **S** and vice versa.

Since the register has one figure more than the entry slide, the last register wheel can move from nine to zero only because of a transmission and therefore during the engagement of the register with the transmissions sectors 6.

1. *Second register.*

The transmission sector of the wheel of the units includes the right part 112 (fig. 1) of the circular transmission bridge. The extension **a** of the part 112 rests against the step **b** of the small release plate 113 running on the left part 114 of the circular transmission bridge which has therefore two release parts. The 114 is supplied with the finger **c** placed

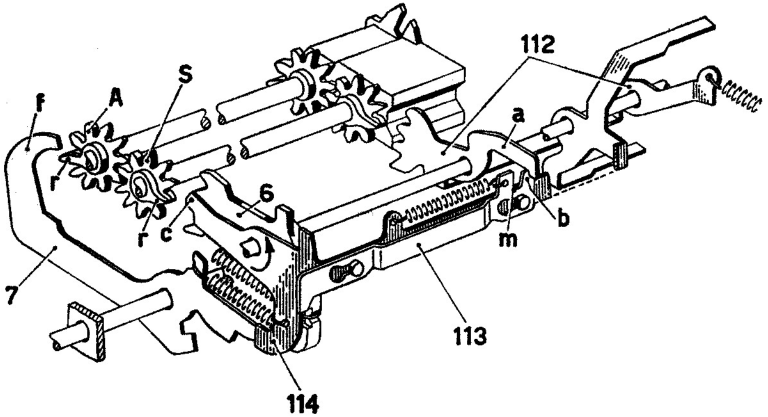
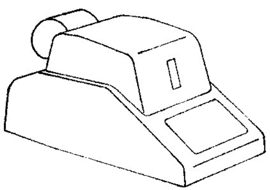

f
A
S
r
r
c
6
7
112
a
b
m
113
114

Fig. 1



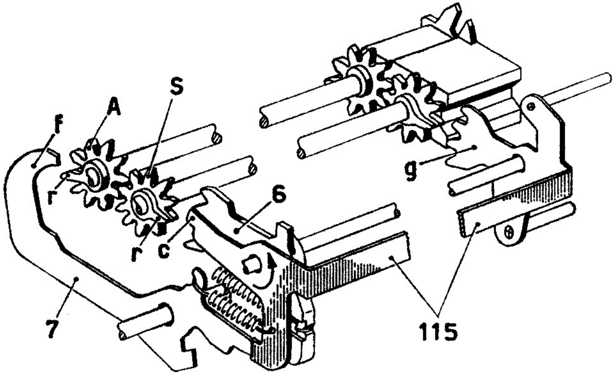

f
A
S
r
r
c
6
g
7
115

Fig. 2

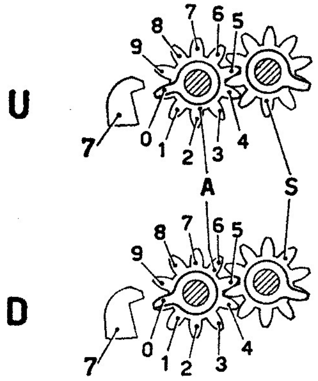

U
9
8
7
6
5
7
0
1
2
3
4
A
S
D
9
8
7
6
5
7
0
1
2
3
4

Fig. 3

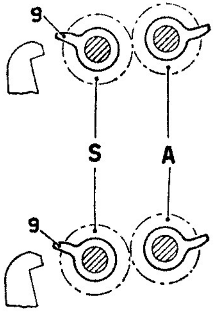


Fig. 4

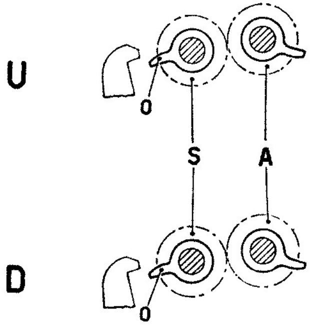


Fig. 5

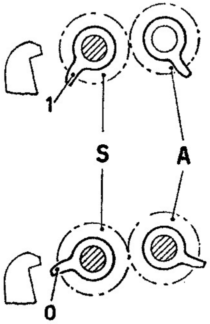


Fig. 6

on the plane of the tooth **r** of the register left wheel. If this wheel moves from " 9 " to " 0 ", its transfer tooth **r** drags downward the finger **c**; the part 114 rotates therefore in the direction of the arrow together with the small plate 113 and to the right part 112. This latter compels therefore the wheel of the units to move by one step thus introducing the circular transmission transfer unit in the register.

The circular transmission can be excluded in the second register by moving the small plate 113 rightward so that to displace the opening **m** in connection with the extension **a** of the part 112 as in case of the division (Chap. XLVI).

2. *First register.*

The bridge 115 (fig. 2) of the first register circular transmission (one part only) includes the finger **c** similar to that seen on the part 114 and the sector **g** with which engages the whell of the units. When the left wheel moves from " 9 " to " 0 " the bridge 115 is rotated in the direction of the arrou and the sector **g** rotates the wheel of the units by one step, thus performing the circular transmission. In the first register the circular transmission is never excluded.

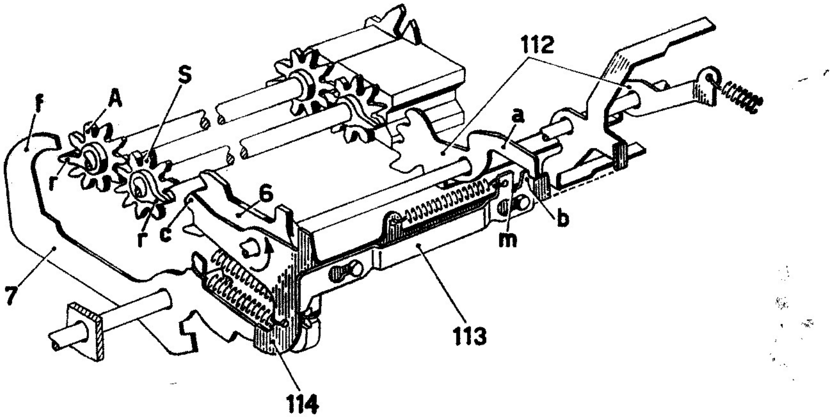
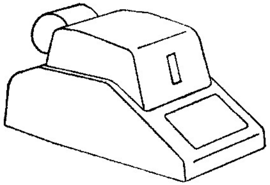

112
S
A
f
a
r
6
r
c
b
m
7
113
114

Fig.1



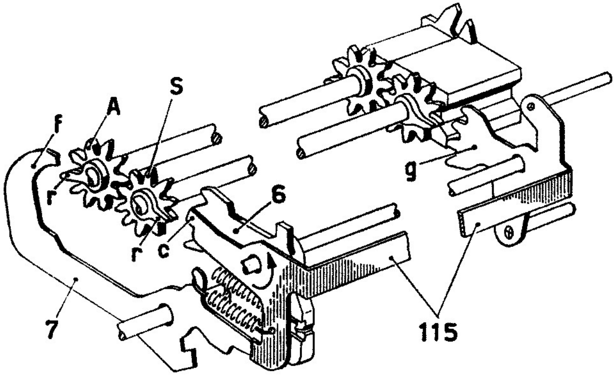

S
A
f
r
6
r
c
g
7
115

Fig.2

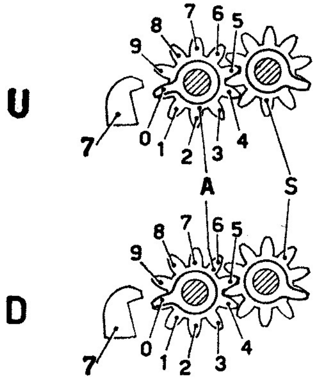

U
7
6
5
8
9
7
0
1
2
3
4
A
S
D
8
7
6
5
9
7
0
1
2
3
4

Fig.3

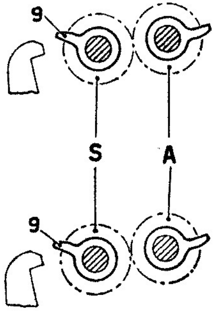


Fig. 4

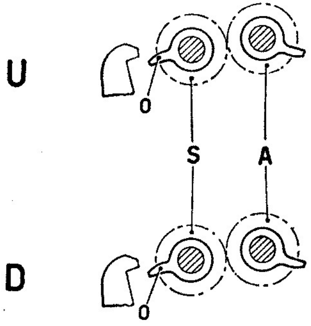


Fig.5

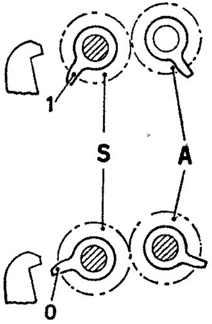


Fig.6

VIII - Credit balance.

b) *Balance sign inticador.*

We have seen in the precedent chapter that in case of a negative result the exact balance is contained in the subtracting wheels; a positive balance is contained in the adding wheels. The total must be therefore asked from the subtracting weels. This is why we have attached to the circular transmission a balance sign indicator which has the double function:

— to check the register inversion mechanism during total operations, to choose which one of the two sets of wheels should it engage with the executers;

— to show to the operator, through a window, the balance sign.

It is clear that the balance can pass from positive to negative only if the circular transmission takes place during a subtraction and can pass from negative to positive only if the circular transmission takes place during and addition. The balance indicator attachment is therefore crecked by both circular transmission and register inversion mechanisms.

1. *Second register.*

We have illustrated in the fig. 1 the balance sign indicator concerning the second register. It is in positive balance position, while the register is in adding position.

When we depress the subtraction key 76 of the second register we rotate the crank 117 together with the lever 105 in the direction of the arrow. The crank 117 drags and rotates the rocker 116 by means of the wing **a**. This rocker moves to the hachured position illustrated in the fig. 1 with the extension **c** on the trajectory of the wing **d** of the part 114 of the circular transmission bridge.

If we now perform a circular transmission, the part 114, by rotating in the direction of the arrow, moves the rocker 116 backward through the wing **d**. The rocker drags the wing **b** of the bridge 129 which is turned in the direction of the arrow. The bridge 120 now loèers the stay 118 hich moves its extension **e** to engage with the uing **f** of the arm 119 which is integral with the lever 105. Furthermore, the extension **g** of the bridge 120 rotates, through the pin **h**, the balance indicator bridge 121 to carry its indicator wing **m** in connection with the windown of the fixed support 31. The indicator 121 works as stabilizer of the bridge 120 which remains therefore in the reversed position until the balance is negative.

If the balance is positive and we add a figure which exceeds the capacity of the register, the circular transmission is performed all the same. Since in this case the rocker 116 is at rest as illustrated in the figure 1, the wing **d** doesn't meet with the extension **c** and the rocker 116 leaves the bridge 120 in the position shown in the figure 1.

If the balance is negative and we perform an adding cycle, the rocker 116 is moved back and its arm **p** is on the trajectory of the wing **q** of the part 114 (fig. 2). If in this cycle there is a circular transmission, the part 114 rotates in the direction of the arrow and, through the wing **q**, it pushes forward (to the right in the figure 2) the rocker 116 moving back to the position shown in the fig. 1 the bridge 120, the stay 188 and the balance indicator 121.

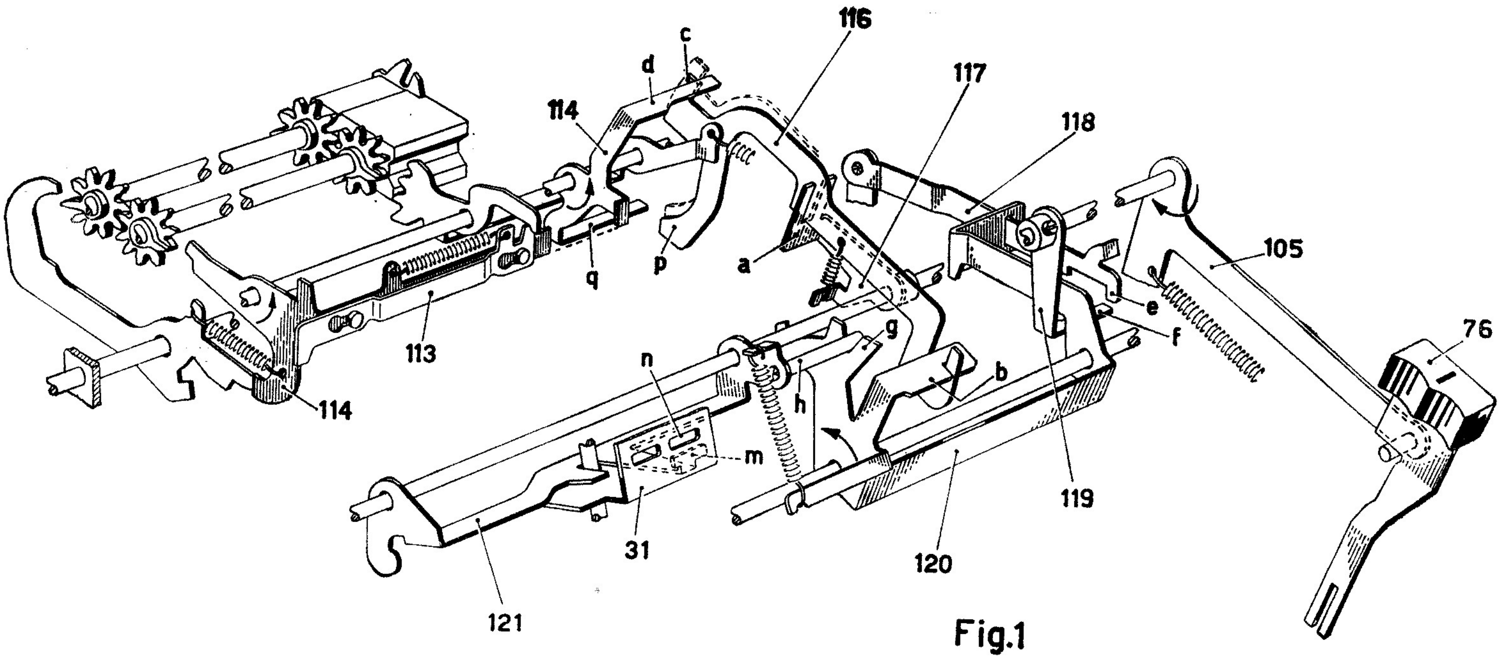

116
c
d
117
114
118
105
a
p
q
113
114
e
f
76
g
b
n
h
m
119
31
120
121

Fig.1

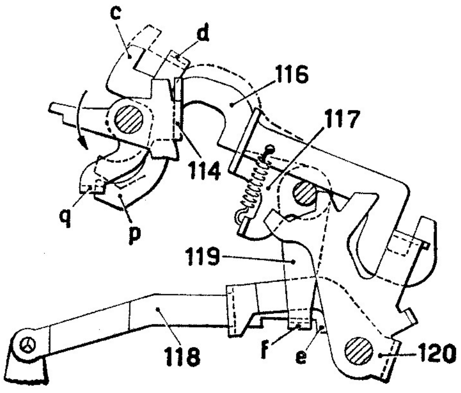
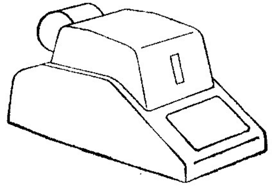

c
d
116
117
114
q
p
119
118
f
e
120

Fig.2



If, on the contrary, the balance is negative and in a subtracting cycle there is a circular transmission (exceding the capacity in substraction) the arm **p** is in the position illustrated in the fig. 2 and it is not met by the wing **q** of the part 114.

Concluding, the position of the stay 118 shows the sign of the balance. It is placed with its extension **e** in the position shown in the fig. 1 if the balance is positive; if the balance is negative it moves down and engages the extension **e** with the wing **f** of the arm 119. This engagement is used during the total cycles, as we shall better see at Chap. XVII. The wing **m** of the indicator 121 is the visible balance indicator and indicates the balance sign to the operator.

The machine indicates the balance through the stay 118 and the indicator 121 even when the small plate 113 is moved to the right to exclude the circular transmission (Chap. XLVI).

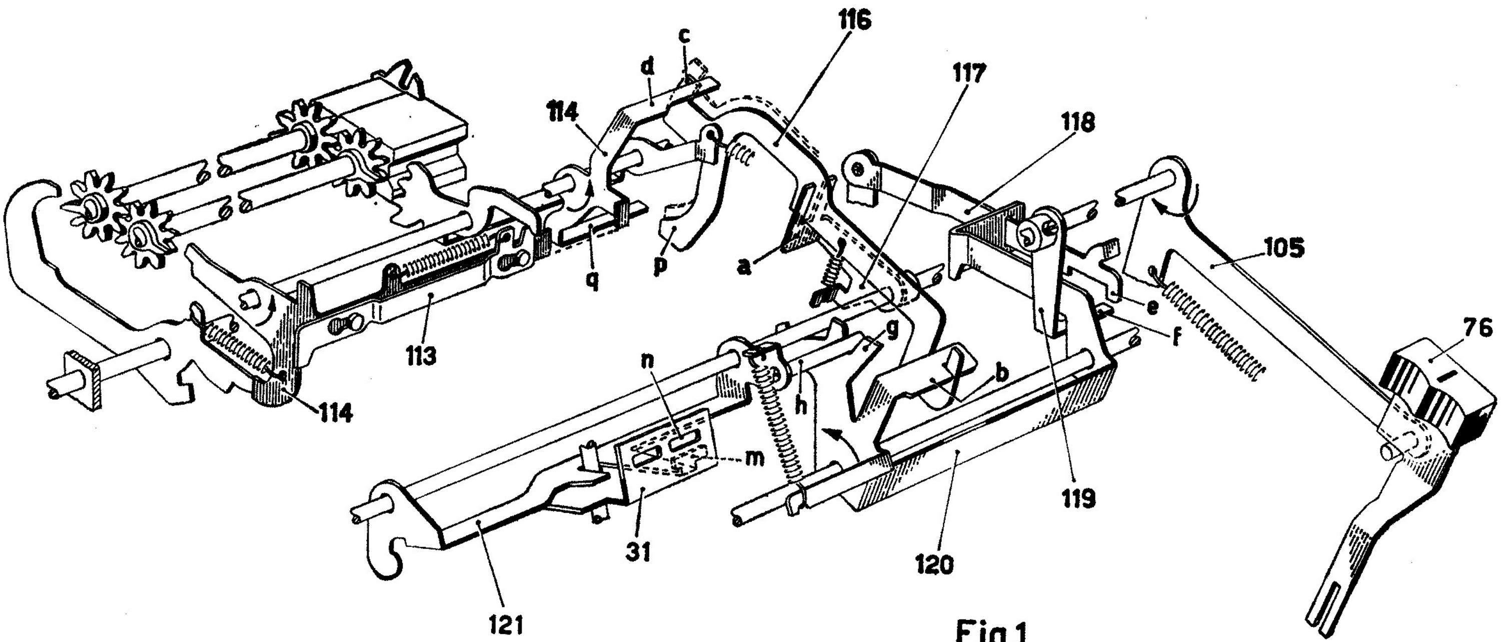

116
c
d
117
114
118
105
76
a
p
q
113
114
g
n
b
e
f
h
m
119
31
120
121

Fig.1

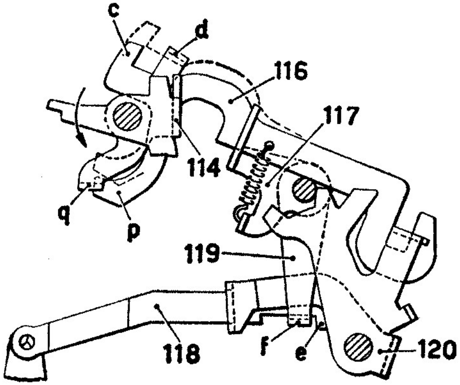
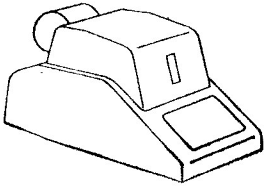

c
d
116
117
114
q
p
119
118
f
e
120

Fig.2



b) *Balance sign indicador.*

2. *First register.*

We have illustrated in the figure 1 the balance indicator mechanism of the first register in positive balance position and the register in adding position.

When the subtraction key 93 is depressed we also rotate together with the arm 106, in the direction of the arrow, the crank 127 which, through its wing **a**, rotates the rocker 126 round the pin **b**, of the bridge 125. The rocker 126 moves thus to the hachured position illustrated in the figure 1, with the extension **c** on the trajectory of the pin **d** of the circular transmission bridge 115.

If we perform now a circular transmission, the bridge 115 by rotating in the direction of the arrow drags the rocker 126 back by means of its pin **d**. The rocker rotates in the direction of the arrow the bridge 125 which raises the stay 123 moving its wing **g** behind the extension **h** of the bridge 124. Furthermore, the extension **m** of the bridge 125 rotates, through the pin **n**, the balance indicator bridge 122 so that moving its wing **p** in front of the opening **q** of the fixed support 31. The indicator 122 works as stabilizer for the bridge 125.

If the balance is negative and we perform an adding cycle, the rocker 126 is displaced backward and its arm **e** is on the trajectory of the pin **f** of the bridge 115 (fig. 2). If we perform now the circular transmission, the bridge 115 moves back forward (to the right in the fig. 2) the rocker 126, carrying also back to the position illustrated in the fig. 1 the bridge 125, the stay 123 and the bridge 122.

In case of exceeding the capacity in addition or in subtraction, the circular transmission doesn't influence the position of the bridge 125, just as for the second register (precedent page).

Concluding, the position of the stay 123 indicates the sign of the balance. The stay has the wing **g** in the position illustrated in the figure 1 if the balance is positive; if the balance is negative it rises and places the wing **g** behind the extension **h** of the bridge 124. This latter is supplied with a wing **r** which actuates the arm 127 as we shall see better at Chap. XVII. The wing **p** of the bridge 122 is the visible balance indicator and shows the balance sign to the operator.

The bridge 124 is also supplied with an arm **s** with wich is engaged the wing **t** of the stay 118 when the balance of the second register is negative. This to enable us to transfer a total from the second register to the first with its own sign, as we shall see better at Chap. XVII.

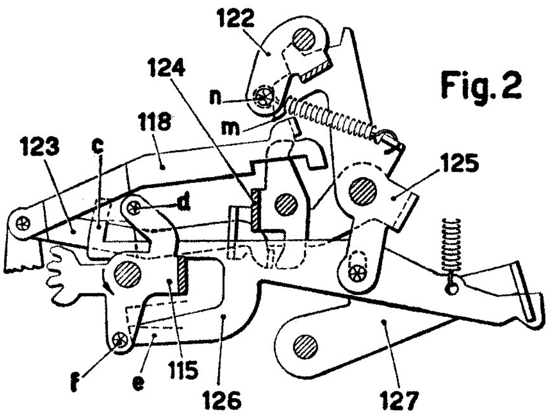
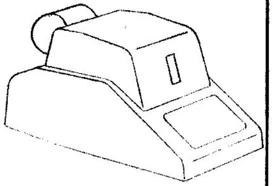

122
124
n
m
118
123
c
d
125
f
e
115
126
127

Fig. 2



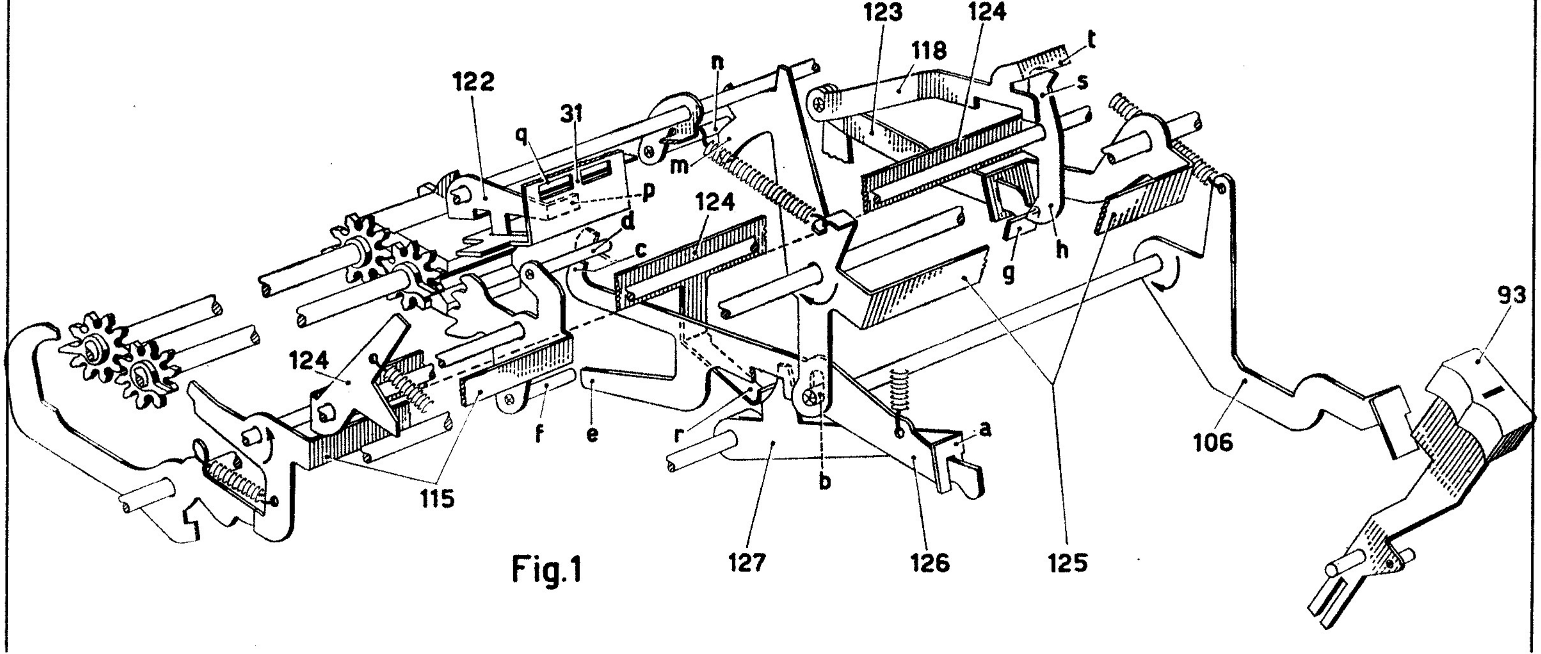

123
124
118
t
s
n
122
31
q
m
p
124
d
c
g
h
93
124
115
f
e
r
a
b
106
127
126
125

Fig. 1

IX - Printing mechanism.

The printing of the figures entered in the keyboard and of the results is performed by means of type-wheels 2 each one of which engages with an executer 11 through a small rack 128. This latter is pivoted downward on the executer 11 and it engages upward with a pinion **a** integral with the tipe-wheel 2.

Each type-wheel 2 is centered on the slider 3 actuated toward the platen 1 by its own spring. The wing **b** secured on the slider 3 holds the small rack 128 always engaged with the pinion **a**. The sliders 3 are usually held at rest by the universal bar 134 carried by the two connecting-rods 129. Each connecting-rod is guided in two slots cut in the side-plates of the machine and is moved to and fro by two rollers **c** of the axle 101 of the bridge 46 which both run in the slot **d** of the connecting-rods 129.

a) *Presetting the printing.*

In the first part of every cycle the executers 11 preset, by rising, the type-wheels 2 so that they present in front of the platen 1 the type-faces of the figure to be printed. The wing **f** of the executers 11 which rise to position zero releases the extension **g** of the corresponding hook 4 which can therefore engage with the printing control plate 133.

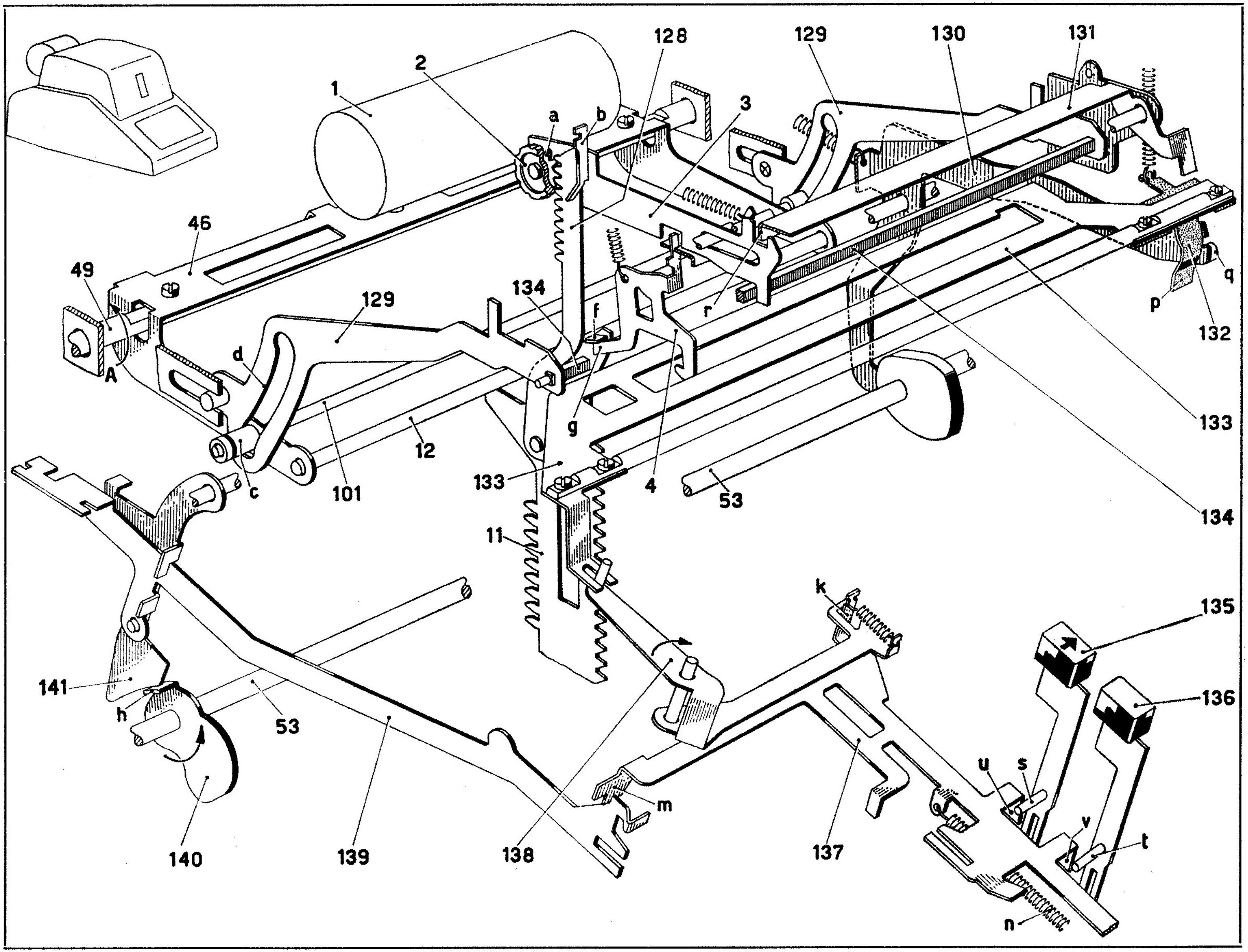
Furthermore, at the beginning of the cycle the lever 141, which rests on the wing **h** of the cam 140 of the main shaft 53, is released by the wing **h**. The connecting-rood 139 pivoted on the lever 141 can then move forward actuated by the wing **m** of the plate 137 which is dragged forward by its pring **n**. The wing k of the plate 137 rotates consequently the lever 138 in the direction of the arrow. This lever moves now the plate 133 rightward thus moving the wing **p** of the small plate 132 fixed on it on the trajectory of the pin **q** of the printing control lever 130.

When the bridge 46 rotates in the direction of the arrow and the rollers **c** of the axle 101 move the connecting-rods 129 backward, the universal bar 134 moves back and releases the sliders 3 which stop immediately against the bent **r** of the plate 131. The printing will then be controlled by the lever 130 which actuates the wing **p** thus preset, as we shall see in the following paragraph.

In the second part of the cycle, after the printing, the universal bar 134 moves back to rest the sliders 3, while the universal bar 12 restores the executers 11. Furthermore, the connecting-rod 139, actuated by the cam 140 returns to rest, moving the plate 137 together with the lever 138 and the plate 133 back to the position illustrated in the figure.

In the cycles in which we don't wish the printing to be performed, it is sufficient preventing the plate 137 moving forward. This is the case of the clearing cycles when, by depressing the key 135 (Clearing the last digit entered) — Chap. XV — or the key 136. Complete clearing of the entry — Chap. XIV — we move the pin **s**, **t** on the trajectory of the wing **u**, **v** of the plate 137 preventing it moving forvard. In this case, the plate 133 don't move the extension **p** on the trajectory of the pin **q** of the lever 130; consequently the printing is not performed.

The other cycles in which the printing is not performed are the multiplication and division non-printing cycles, as we shall better see in the Part II.


a
b
A
f
d
g
r
q
p
c
k
h
u
s
v
t
m
n

IX - Printing mechanism.

b) *Printing control.*

We have seen in the precedent paragraph that in the first part of the cycle, while the executers 11 move upward and the universal bar 134 releases the sliders 3, the hooks 4 corresponding to the executers moved upward get hooked on the plate 133. This latter has moved rightward carrying the wing **p** of the small plate 132 on the trajectory of the pin **p** of the lever 130 thus presetting the printing control.

At 120° of the cycle, the cam 142 of the main shaft 53 starts rotating the lever 130 in the direction of the arrow. The rotation of the lever 130 is transmitted at its turn to the lever 143. The pin **q** of the lever 130 then actuates the wing **p** of the plate 133 which is rotated on its axle 144 in the direction of the arrow, dragging therefore down the hooks 4 which were hooked on it. To lower all the hooks 4 of the sliders 3 at the right of the higher digit, even if the corresponding executers 11 are remained at zero, each hook has a lateral extension **a** which drags down the step **b** of the hook 4 placed at the right (fig. 2). Since just when the hooks 4 are lowered the sliders 3 (fig. 1) are still resting against the bent **r** of the plate 131 (par. *a*), the hooks 4 are dragged down when they are discharged.

At 134° of the cycle, the lever 143 meets with the wing **c** of the plate 131 which is now rotated in the direction of the arrow thus releasing all the printing sliders 3. The sliders 3 corresponding to the hooks 4 lowered move consequently their type-wheels 2 to strike against the platen 1; the printing is therefore performed. On the contrary, the sliders 3 corresponding to the hooks 4 remained in high position go stopping against the upper end **d** of the same hooks.

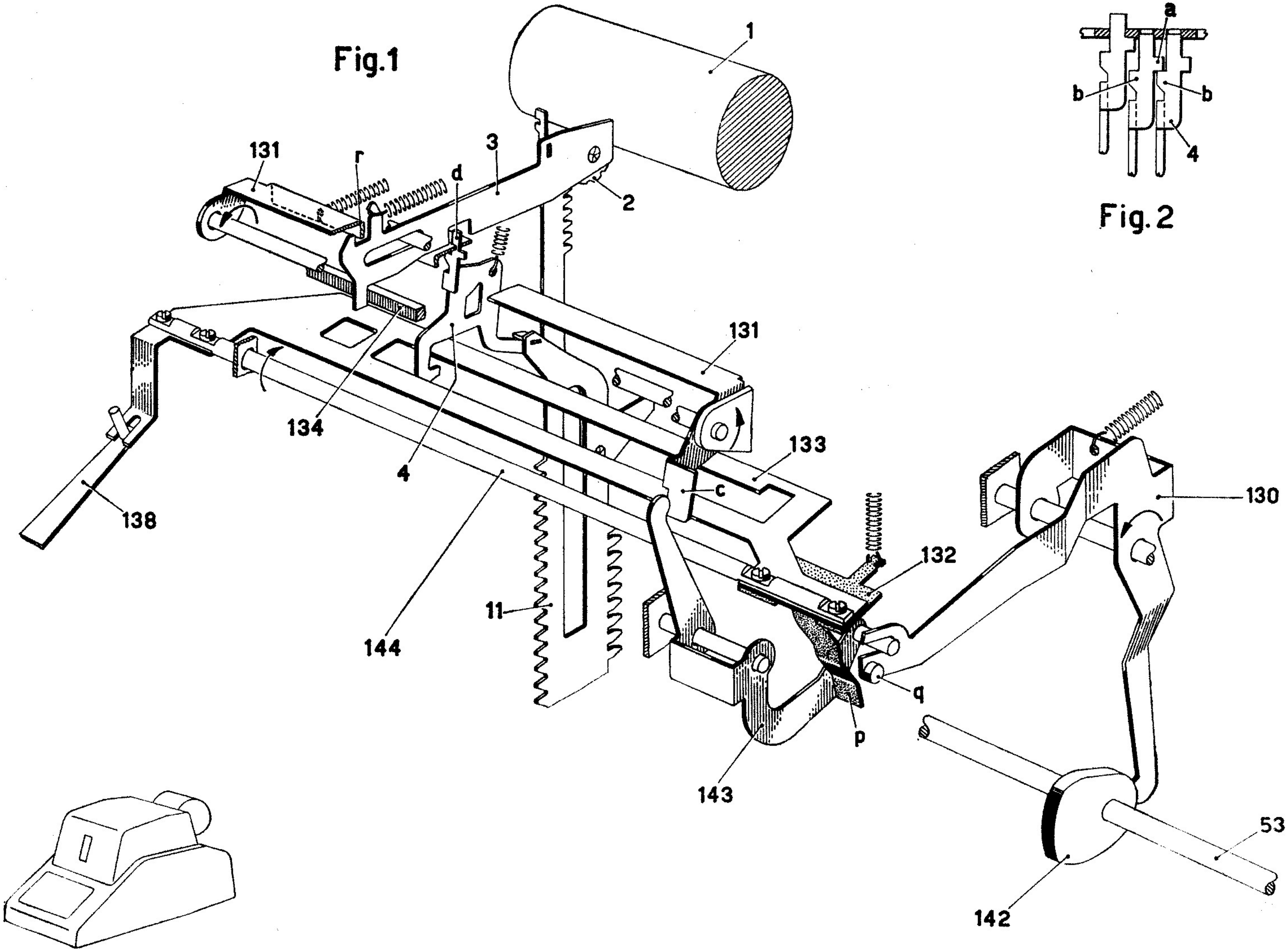


Fig.1

Fig.2

1
2
3
4
11
131
131
r
d
133
c
130
132
134
138
144
143
p
q
142
53
a
b
b
4

X - Platen line-spacing.

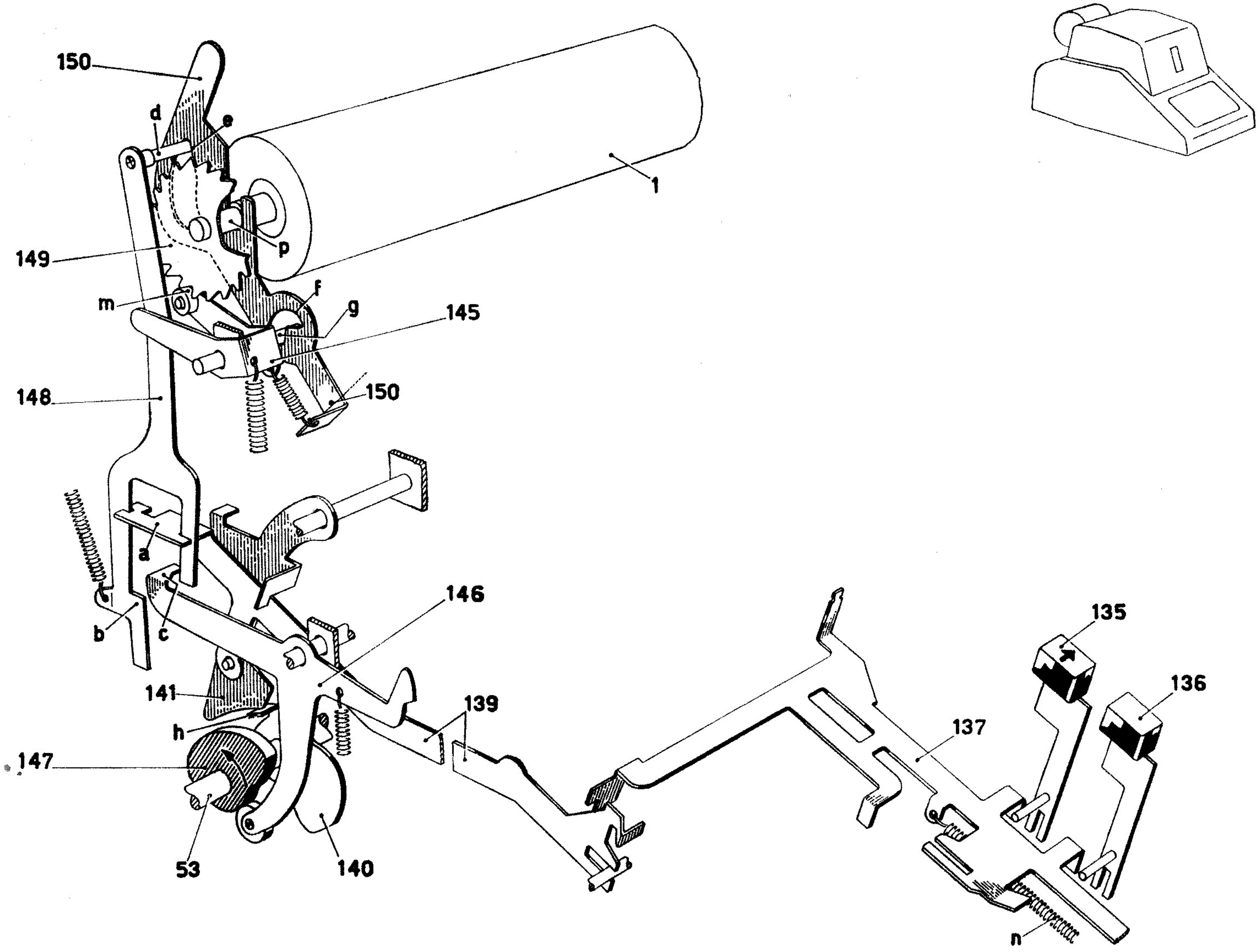
The line-spacing mechanism makes the platen 1 to advance by one step every time the printing of a figure is done.

At the beginning of the cycle, as we have already seen at Chap. IX, par. *a*, the lever 141 is released by the wing **h** of the cam 140 and the connecting-rod 139 is move forward by the plate 137 actuated by the spring **n**. By means of its wing **a** the connecting-rod 139 drags the fork 148 thus carrying the step **b** under the wing **c** of the line-spacing control lever 146.

Whe the printing has been made as seen at chap. IX, the cam 147 rotates the lever 146 so that the wing **c** pushes the fork 148 down. The pin **d** of the fork is guided by the slot **e** of the lever 150 and engages with a tooth of the wheel 149 thus rotating this latter by one step tegether with the platen 1. The simple line-spacing has therefore been performed. The roller **m** of the stabilizer 145 hold every time the wheel 149 in the position reached.

In the cycles in which the printing is not performed, as for instance in the clearing cycles, the keys 135 and 136 prevent the plate 137 moving forward (Chap. IX); consequently the connecting-rod 139 is not dragged forward during the cycle. The tooth **b** of the fork 148 don't move under the wing **c**, the lever 146 oscillates idly and don't perform the platen line-spacing.

As we shall see better at Chap. XVII, par. *b*, it is possible presetting the double line-spacing for the total cycles only by moving forward the lever 150 pivoted on the axle **p** of the platen 1. The slot **f** of the lever 150 cooperating with the fixed pivot **g** holds the lever 150 in one of the two positions.


150
d
e
1
149
p
m
f
g
145
150
148
a
b
c
146
141
h
147
53
140
139
135
136
137
n

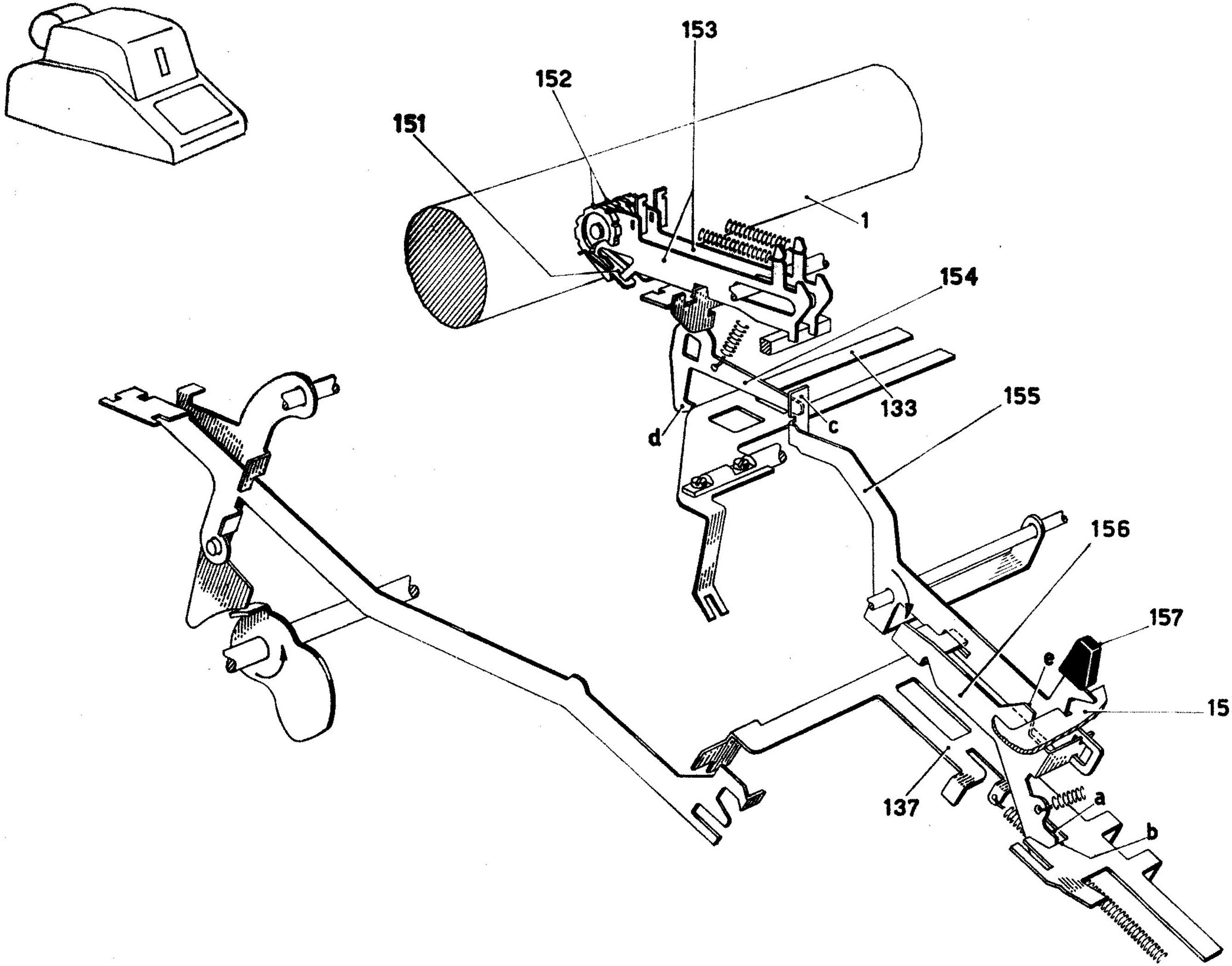
XI - Dater.

The date is printed by the four type-wheels 152 carried two by the two sliders 153. The type-wheels 152 are held in position by a leaf spring 151 and are adjiusted by hand according to the date e wish to print.

By depressing the date key 157, the lever 155 rotates in the direction of the arrow, moving the end **a** of the hook 156 under the edge **b** of the plate 137. The hook 156 which runs on the lever 155, moves therefore forward getting engaged under the plate 137 and holding the key 157 down. The lever 155 releases, by rotating, the hook 154 from the wing **c**; this hook engages its extension **d** under the printing control plate 133.

If we now perform a cycle in which there is printing, the plate 133 moves down and the hook 154 releases the two sliders 153 which move the wheels 152 to strike against the platen 1.

During the first part of the cycle, the plate 157 moves forward (Chap. IX) and releases the end **a** of the hook 156. This latter makes a short trip upward and stops with its lug **e** against the lower surface of the fixed plate 158. In the second part of the cycle, the plate 137 moves back and with the edge **b** drags the hook 156. This hook is therefore released from the plate 158; consequently it can at last return to rest together with the lever 155 and the date key 157.


c
d
e
a
b

XII - Slide restoring.

At the end of the cycle, it is necessary moving back the slide to starting position so that it is ready for a new entry.

Furthermore all the stops set should be moved back to rest.

During the entry, when the slide move leftward, the slide restoring lever 35 rotates step by step in the direction of the arrow, rotating at the same time the frame 165 in the direction of the arrow. In the figure 1 are illustrated four columns of the slide.

In the last part of the cycle, the cam. 140 of the main shaft 53 rotates the lever 170 in the direction of the arrow. The rod 169 is pushed upward and acts on the wing **a** of the frame 165 moving this latter back to rest position together with the lever 35. This lever moves then the entry slide back to rest position, reloading at the same time the spring 36. The slide is immediately hooked at rest by the movable dog 23 by means of the escapement stop 24 of the first column which, as we have seen at Chap. II, is always pushed forward by the pressure spring 26.

As soon as the slide has been restored, the cam 160 of the main shaft 53 acts, by means of the lobe **b**, on the pin **c** and pushes the slider 159 forward. On this slider is fixed the clearing plate 161 which is therefore pushed against the stops set of the slide thus clearing the entry.

XIII - Repetition of the figure entered.

We have seen that the restoring of the entry slide is performed by the rod 160, fig. 1. This latter is connected to the bridge 167 by means of the connecting-rod 168; the pin **d** of the bridge rests on the bridge 166 connected at its turn to the repeat slider 164. At rest, the bridge 166 rests with the extension **e** on the wing **f** of the connecting-rod 139.

At the beginning of a cycle, we know that the wing **h** of the cam 140 releases, by means of the lever 141, the connecting-rod 139. The bridge 166 can then rotate in the direction of the arrow until the slider 164 stops against the stem 163 of the repeat button. If this latter is at rest as illustrated in the figure, the slider stops immediately with the step **g** against the extension **m** of the stem 163 and the rod 169 takes the working position shown in the fig. 2 thus performing the slide restoring. If, on the contrary, the repeat button has been moved to the left, the step **g** passes through the slot **n** of the stem 163 and the slider 164 stops against this latter with the step **p** only. The rod 169 thakes then a non-working position in which, as we can see in the fig. 3, it doesn't met with the wing **a** of the frame 165 and the slide remains in set position.

At the end every cycle, the wing **h** of the cam 140 carries the slider 164 back to rest position by means of the lever 141, the connecting-rod 139 and the bridge 166.

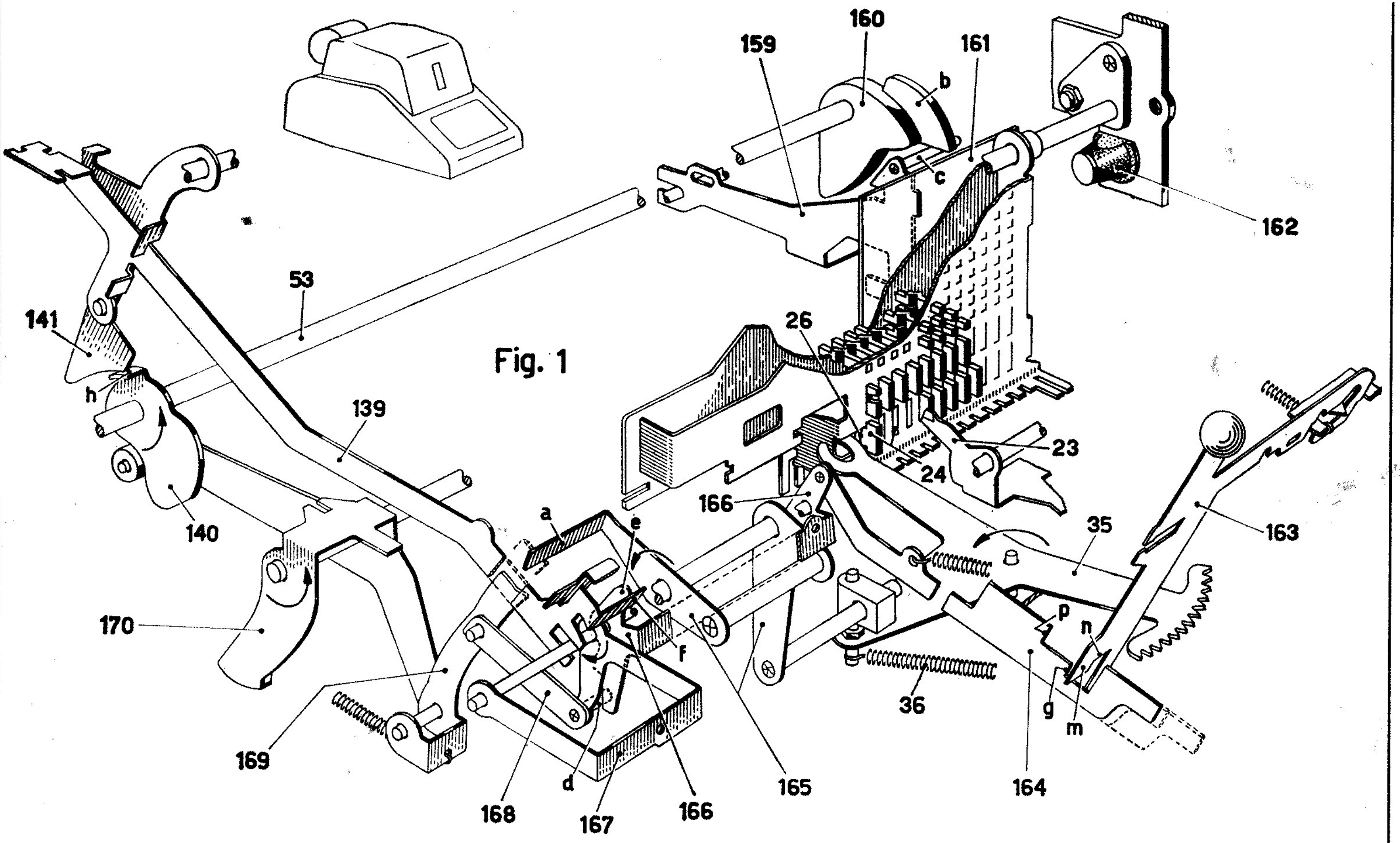


Fig. 1

160
159
161
b
c
162
53
141
h
26
139
140
23
24
166
a
e
35
163
170
p
n
f
36
g
m
169
d
165
164
168
167
166

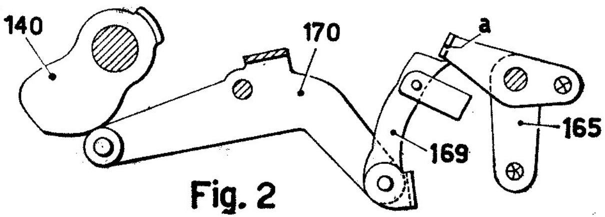


Fig. 2

140
170
a
169
165

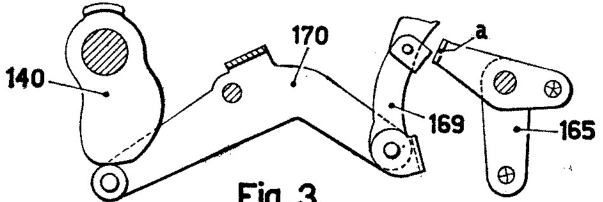


Fig. 3

170
a
140
169
165

XIV - Complete clearing of the entry.

This is done by moving back to rest the entry slide during a cycle. In this cycle, which is also a non-add cycle, the print-ing and the line-spacing are prevented.

By depressing the clearing key 136 (fig. 1), the pin **a** moves the slider 173 forward which through the crank 84 starts the machine for a cycle (Chap. VI, par. *a*). But since there is no stop placed on the trajectory of the calculation sliders of the two registers, none is engaged with the executers; it is therefore a non-add cycle (Chap. VI, par. *c*).

Furthermore, the key 136 carries the pin **t** in front of the wing **v** of the plate 137. During the cycle the plate 137 advances therefore only a little, and prevents the printing and the line-spacing (Chap. IX and X).

At last, the same pin **t** moves in front of the step **p** of the slider 164 (see fig. 2) and prevents this latter moving forward; consequently, at the end of the cycle the slide will be carried back to rest position even if the stem 163 (fig. 1) of the repeat button is in working position that is moved toward the left (Chap. XIII).

XV - Clearing of the last digit entered.

This is done by moving the entry slide one step back during a cycle. In this cycle, which is also a non-add cycle, the printing, the line-spacing and the slide restoring are prevented.

By depressing the key 135 the pin **b** moves forward the slider 173 as done by the key 136, starting the machine for a non-add cycle.

Furthermore, the key 135 carries the pin **s** in front of the wing **u** of the plate 137; the printing and the line-spacing are therefore prevented (Chap. IX and X). At last the pin **s** acts on the profile **c** of the slider 164 lowering it (see hachured position, fig. 2); the step **g** can therefore pass under the extension **m** of the repeat button stem 163. In this case, at the end of the cycle, the slide is not moved back to rest position (Chap. XIII).

The slide is moved back one step to the right by the hook 172 (fig. 1) which cooperates by means of its tooth **d** with the teethrange of the cypher plate 28. Normally at the beginning of the cycle, the plate 137 moves forward. The lever 171 which through its arm **e** follows the movement of the plate, rotates therefore in the direction of the arrow thus raising the hook 172 and moving it above the trajectory of the wing **n** of the lever 170. The oscillation of this lever in the direction of the arrow made by the cam 140 remains then without effect.

By depressing the key 135, the forward advance of the plate 137 is on the contrary immediately prevented and the lever 171 doesn't rotate; consequently the hook 172 remains with the left end in connection with the wing **n** of the lever 170. The oscillation of this latter, toward the end of the cycle, produces then the rightward movement of the hok 172 which actuates, by means of its tooth **d**, the teethrange of the cypher plate 28 (fig. 3) moving therefore the slide one step back. As soon as this has been done, the clearing plate 161 is moved forward by the cam 160 (Chap. XII) and clears the stop 9 of the last row set as well as the escapement stop 24. When the hook 172 returns to rest it will rest against the movable tooth 23 to hold the slide in the new position reached.

When the key 136 is depressed, the pin **t** allow a certain travel to the plate 137 which succeeds moving the hook 172 above the trajectory of the wing **n** (hachured position in fig. 1), but prevents the printing all the same.

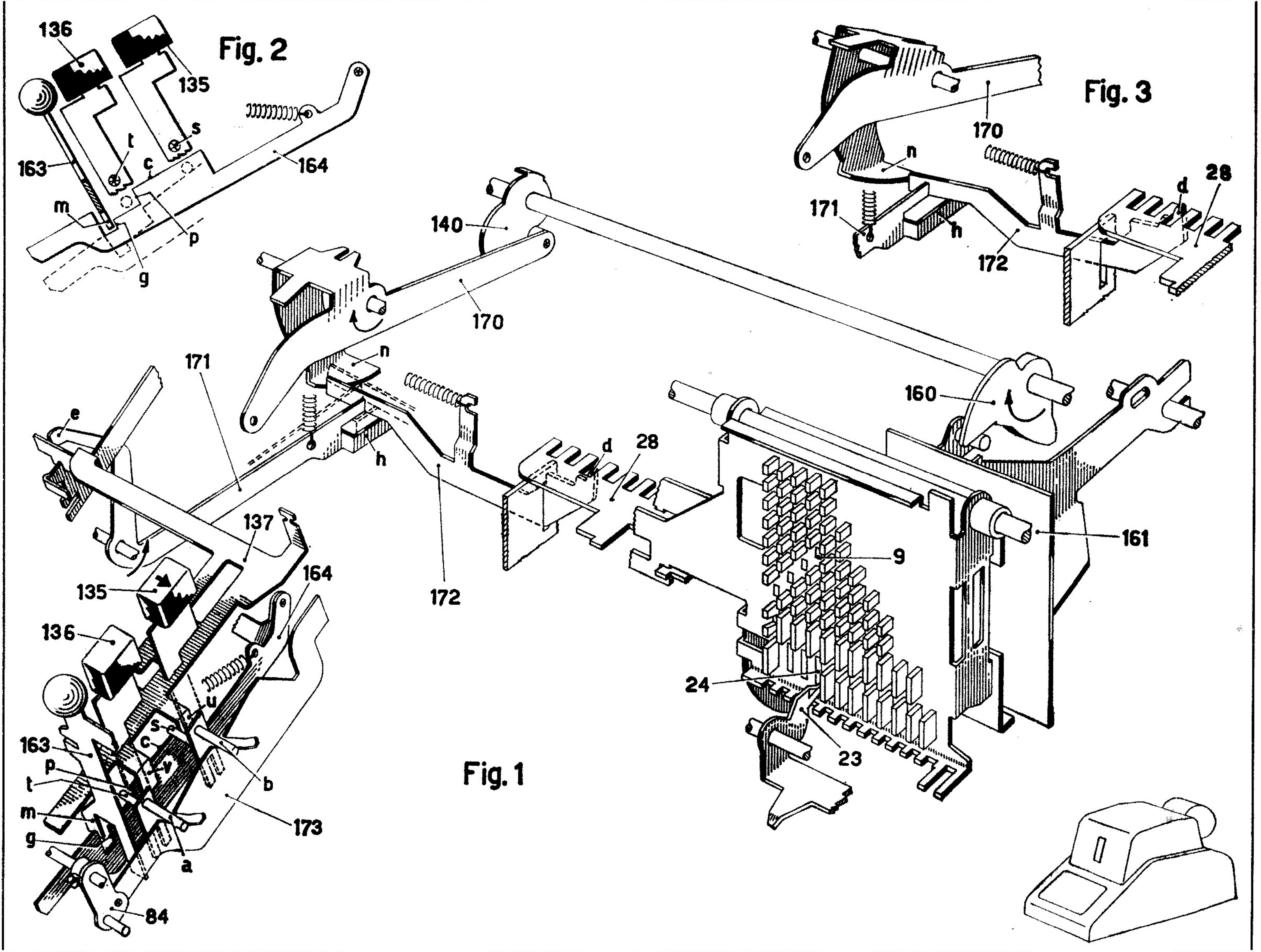


Fig. 2

136
135
163
t
s
c
164
m
p
g

Fig. 3

170
n
171
h
172
d
28

Fig. 1

140
170
171
n
e
h
172
d
28
160
161
9
137
135
164
136
24
23
u
s
163
c
v
p
t
b
m
g
a
173
84

XVI - Clutch and motor starting.

The clutch which couples the main shaft 53 with the motor shaft 187 includes the dragging tooth 189 and the clutch wheel 188. The former is pivoted on the disc 191 set on the main shaft 53 while the clutch wheel 188 runs idle on the shaft 53 (fig. 3). The helicoidal weel 177 at its turn idle on the hub of the wheel 188 is actuated by the worm **a** (fig. 1) of the motor shaft 187. On the hub of the wheel 188 slides the cam 176 (fig. 3). The small flexible plate 180 (see the fig. 1 also) presses the cam against the wheel 177; consequently the cam 176 and the wheel 188 are dragged by friction by the wheel 177.

a) *Cycle control.*

We ave seen in the precedent chapters that the adding keys, as well as the subtracting, the correction and the non-add ones all cause the clutch release slider 78 moving forward. This slider rotates the bridge 175 which raises its roller **b** thus releasing the small plate 190 carried by the disc 191. The small plate 190 trips down and releases the lever 181 which trough the contact **c** closes the electric circuit of the motor; from the other end it releases also the dragging tooth 189 which wing **d** engages then with the clutch wheel 188. In this way the clutch is closed and the machine performs a cycle.

At the end of one rotation of the shaft 53, the roller **b** falls again in the opening **e** of the disc 191 and engages again with the small plate 190. The electric circuit and the clutch are therefore opened again and the machine stops.

b) *Extra-cycle control.*

When performing some operations as for instance the total (Chap. XVII), the motor makes some controls before the beginning the true cycle; we shall call it the *extra-cycle.*

Consequently, the total keys as well as the key 174 not only move the slider 78 forward when they are pressed down but also they move the extra-cycle control slider 197 backward (to the right in the figure 1). The slider 197 rotates in the direction of the arrow the hook 192 which places its profile **f** on the trajectory of the wing **g** of the dragging tooth 189 thus preventing it rotating in the direction of the arrow. Consequently, while the lever 181 closes regularly the motor circuit, the tooth 189 cannot close the clutch. At the same time, the slider 197 rotates the hook 195 which releases the wing **h** of the stay 193 pivoted on the control plate 196. The stay 193 rotates in the direction of the arrow and engages the wing **m** of the bridge 179.

Furthermore the motor has started working and the wheel 177 drags by friction the cam 176. This latter acts on the roller **n** of the bridge 179 and oscillates it continually around the axle 178. At the first oscillation of the bridge 179 in the direction of the arrow, its wing **m** drags the stay 193 backward; the plate 196 moves therefore to the position illustrated in the fig. 2. Toward the end of its travel, the plate 196 strikes against the lower end of the hook 192 with its wing **p** thus releasing the wing **g** from the tooth 189 which can at last close the clutch of the main shaft 53. By moving backward, the plate 196 performs also the controls we shall see later on.

Toward the end of the cycle of the shaft 53, the cam 194 acts on the wing **h** of the stay 193 which rotates then in

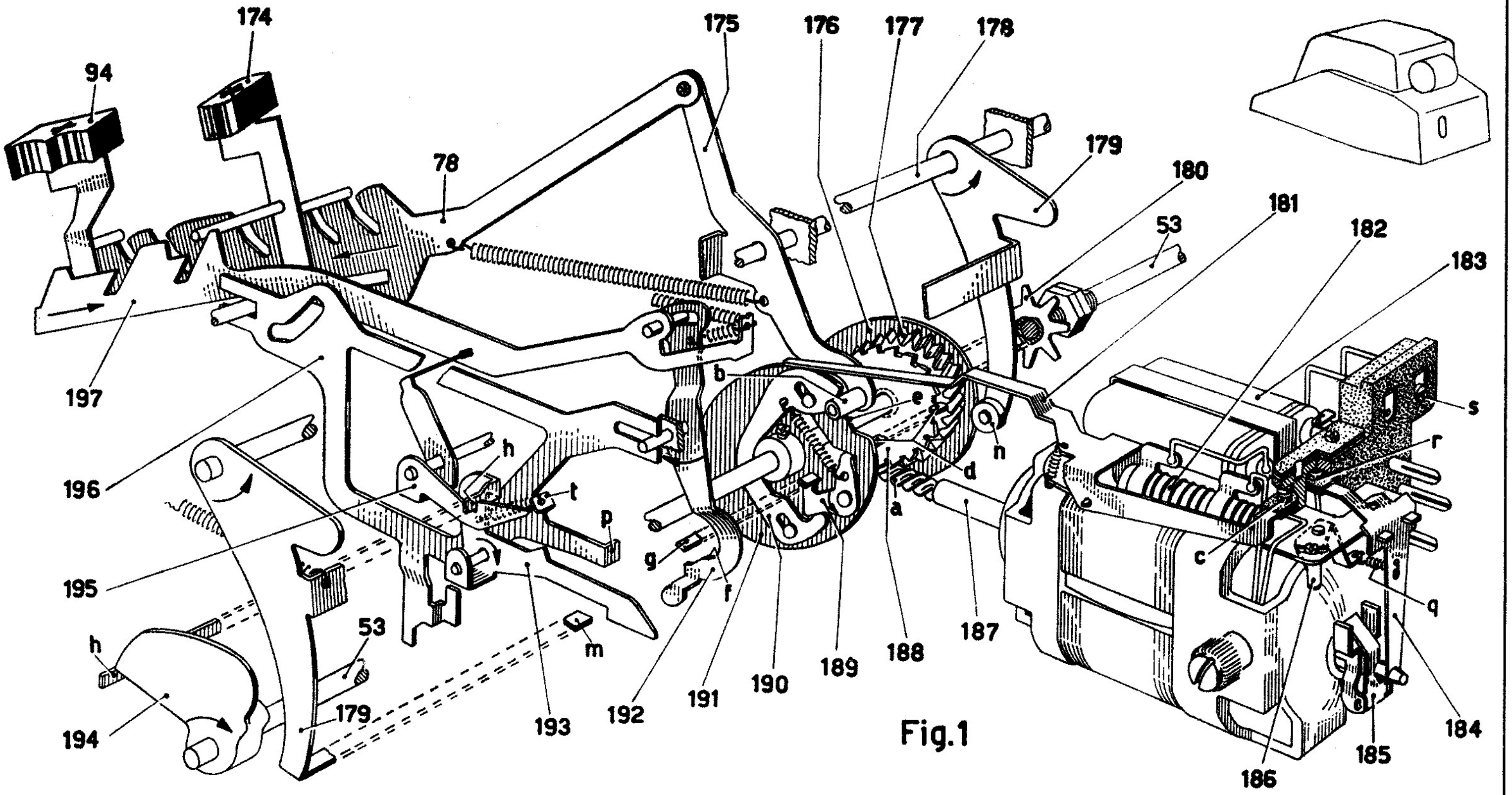

94
174
78
175
176
177
178
179
180
181
53
182
183
s
r
b
e
d
n
h
t
p
g
f
a
c
q
197
196
195
53
h
194
179
193
192
191
190
189
188
187
m
186
185
184

Fig. 1

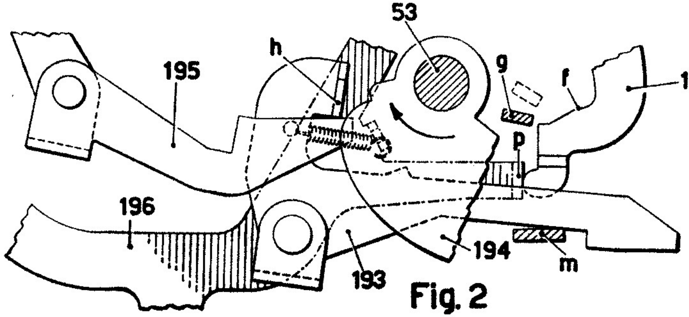

53
h
g
f
192
195
p
196
193
194
m

Fig. 2

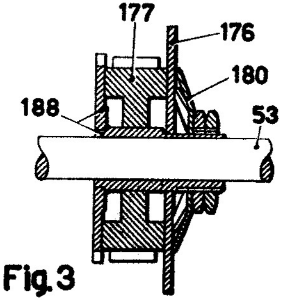

177
176
180
188
53

Fig. 3

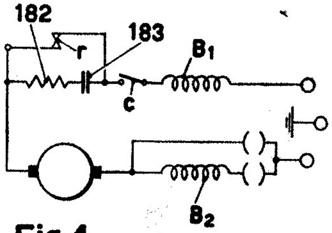

182
r
183
B_1
c
B_2

Fig. 4

the direction opposite to that of the arrow until it stops against the wing **t** of the plate 196 mowing therefore off the trajectory of the wing **m**. The cam 194 continues actuating the wing **h** and compels the stay 193 to move forward bringing the plate 196 back to rest.

When the roller **b** of the clutch lever 175 falls in the opening **e** of the disc 191, the key can return to rest position thus releasing the slider 197 which returns to rest rotating the hook 195 to re-engage the wing **h**. At the end of the cycle, the cam 194 leaves the wing **h**, but the stay 193 remains hooked by the hook 195.

c) *Motor, tension-switch, speed regulator and spark-extinguisher.*

It is a monophase motor with collector which can be excited by two windings **B**$_1$ and **B**$_2$ (fig. 4) under the tension of 180 ÷ 230 V and by the single winding **B**$_1$ under the tension of 110 ÷ 160 V. The tension can be changed by setting the screw **s** (fig. 1) in the post corresponding to the tension of the supply line.

The speed regulator includes the small lever 185 (fig. 1) which, by centrifugal force and against the action of the spring **q**, tries to open the contact **r** carried by the lever 184 and inserted in the motor supply circuit. The tension of the spring **q** can be adjusted by means of a small lever 186 to vary the motor speed. The sparks of the contact **a** are extinguished by means of the condenser 183 and of the resistance 182 in parallel with the contact **r** (fig. 4).

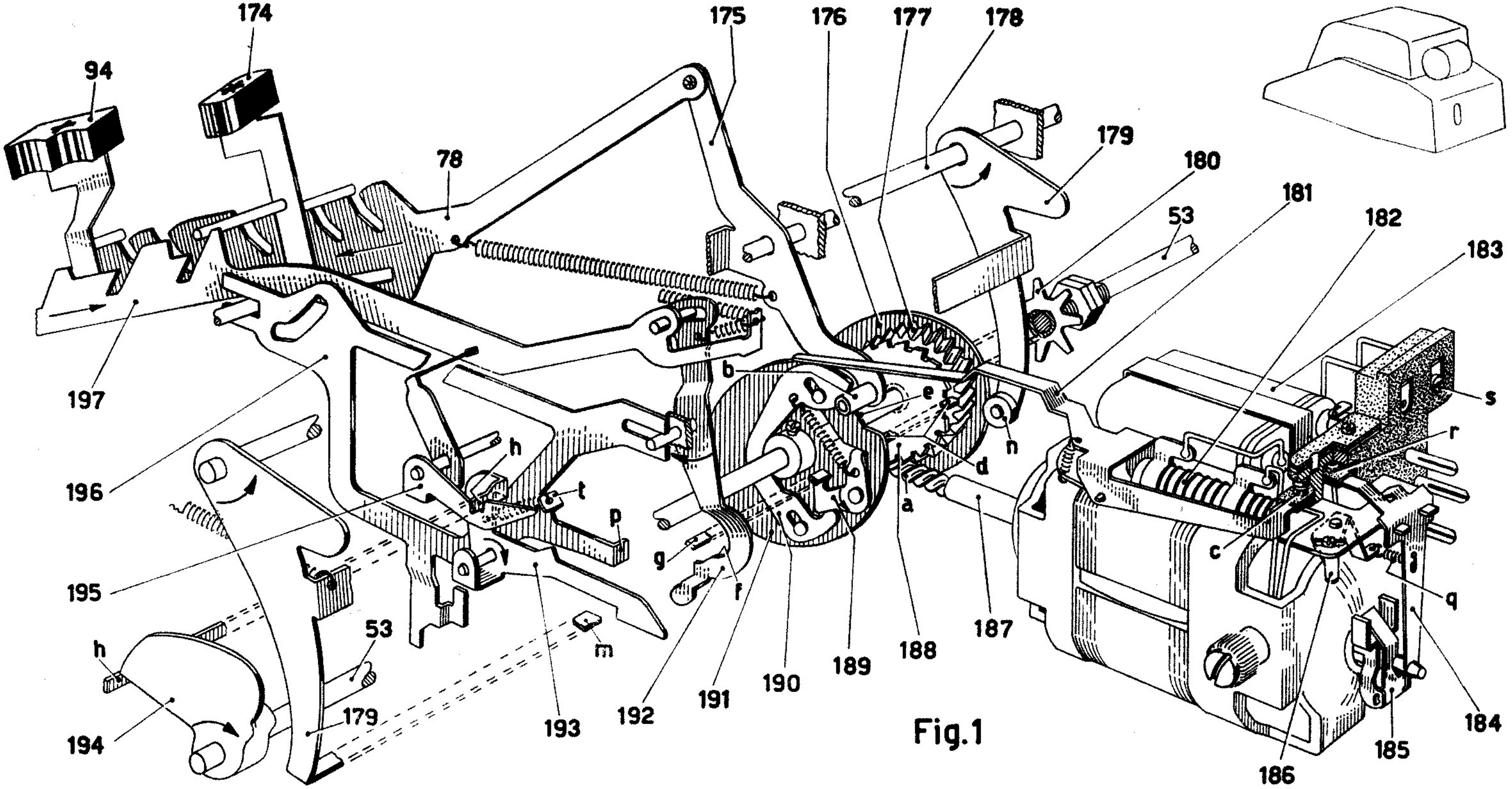

174
94
78
175
176
177
178
179
180
53
181
182
183
s
r
197
196
195
h
t
p
b
e
n
d
a
c
q
g
f
53
h
194
179
193
192
191
190
189
188
187
m
186
185
184

Fig. 1

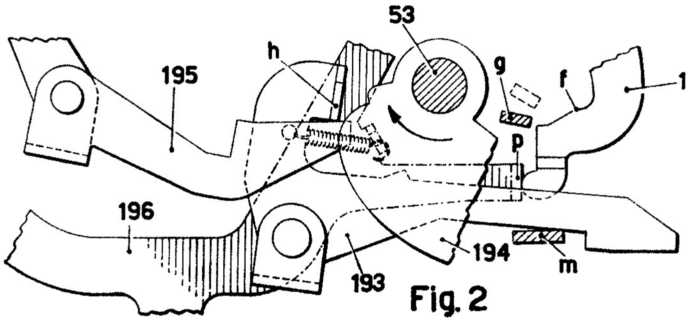

53
h
195
g
f
192
p
196
194
m
193

Fig. 2

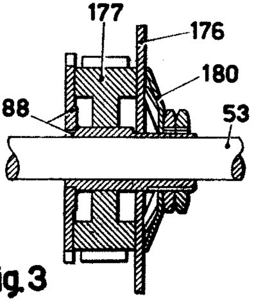

177
176
180
188
53

Fig. 3

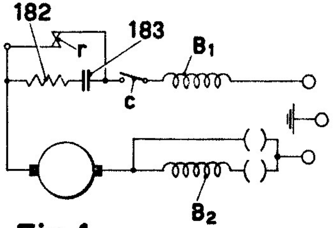

182
183
r
B_1
c
B_2

Fig. 4

XVII - Total.

a) *Foreword.*

After a calculation, the register wheels have moved as many steps from the zero position as are respectively the units, the tens, etc. of the figure accumulated. To print the total, it is necessary to transmit an equal movement to the executers. This is obtained by engaging the register with the executers at the beginning of their upward movement and by rotating backward the single wheels until reaching the zero position.

If, at the end of this movement of the executers, the register desengages from them, the single wheels remain at zero and we obtain *the grand total.* If, on the contrary, the register remains engaged even durin the return movement of the executers, the single wheels after moving to zero, return to starting position; that is the total is reintroduced in the register and we obtain *the sub-total.*

We have already seen at Chap. VIII, par. *a*), that the zero position of a wheel 5 (fig. 2) of the register is defined by the end **f** of the lever 7. While printing the total, the register wheels stop therefore with their transfer tooth **r** against the lower profile of the end **f** of the lever 7 which rest normally against the fixed comb 57.

To print a total it is necessary, before engaging the register, to obtain the following conditions:

a) the register should be preset in such a way to present to the executers 11, the set of wheels from which the total must be taken, that is the adding wheels if the total is positive or the subtracting wheels if the total is negative;

b) the executers 11 should be released from the slide control so that they might move by all the necessary steps to bring the register wheels back to zero.

These conditions are created during the extra-cycle that is before the true total cycle begins. During the extra-cycle there is also the repeat release, the ribbon lifting for printing in red and if requested the presetting of the double line-spacing.

b) *Presetting extra-cycle.*

We have seen at Chap. XVI that by depressing the total key 174 (fig. 1), the slider 78 closes the motor circuit while the slider 197 controls the presetting extra-cycle; consequently the control plate 196 moves backward still before the true cycle begins. The two sliders 78 and 197 are controlled similarly by the other total keys 200, 201 and 202. During its backward movement, the plate 196 performs the following controls:

1. *Repeat release.* The cam-slot **a** of the plate 196 moves down the roller **c** thus rotating the arm 198 fixed on the shaft 199. The crank 205 also set on the shaft 199 rotates therefore in the direction of the arrow and drags, by means of the spring **b**, the lever 204 which rotates around the pivot **g**. In this rotation the front end of the lever 204 meets with the wing **h** of the small bar 203 and pushes this latter together with the repeat stem 163 rightward to non-working position in case it should not already be there.

2. *Ribbon lifting.* The crank 205 rotates the plate 207 around its pin **e** through the stay 206. By means of this rotation, as we shall better see at Chap. XIX, the ribbon is lifted to make the printing in red.

3. *Presetting the double line-spacing.* We have seen at Chap. X that if the lever 150 is in the position illustrated in the fig. 1, we obtain always the simple line-spacing, while by moving the lever forward we preset the double line-spacing for total cycles. In fact, by shifting the lever 150,

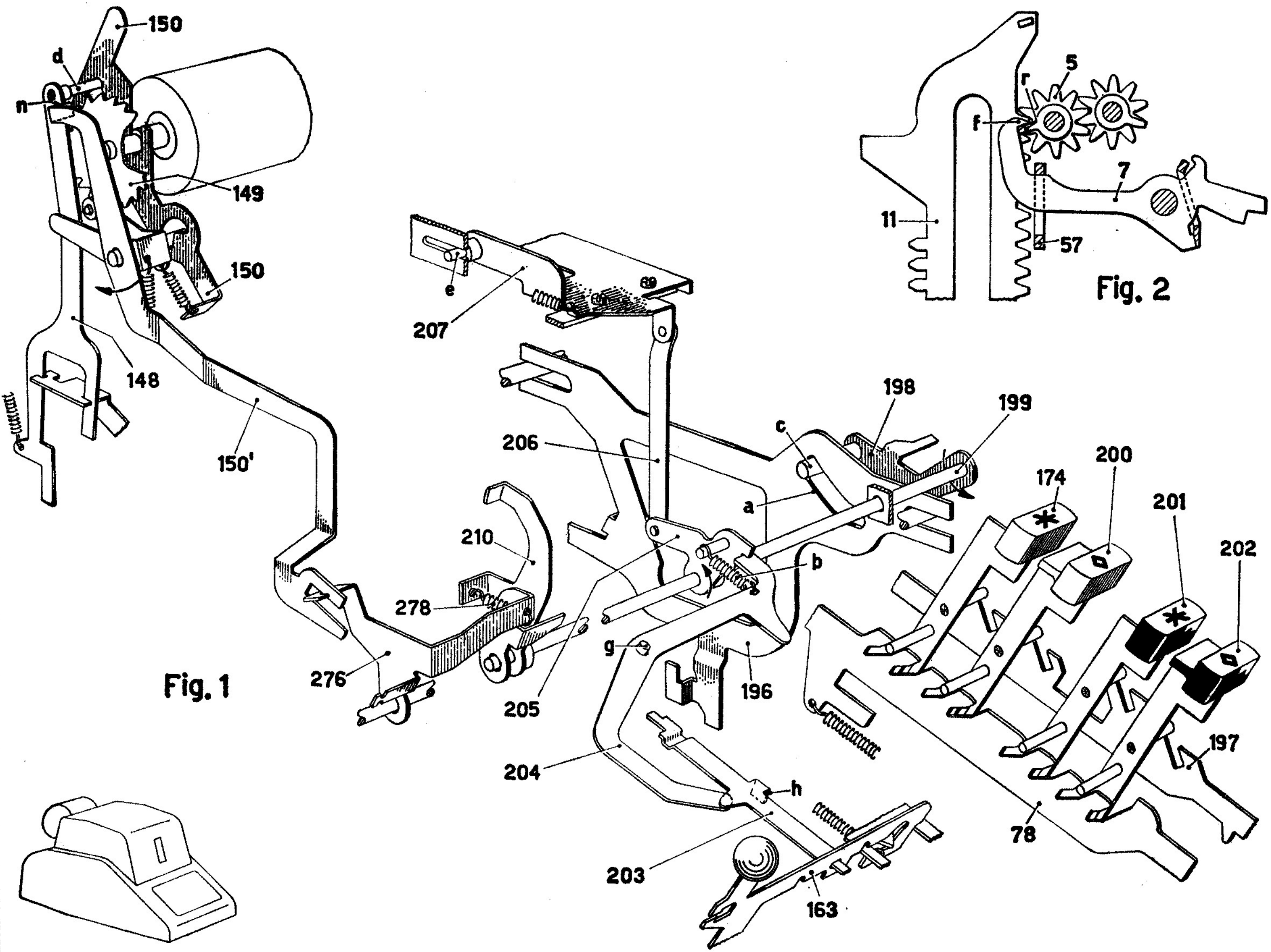

d
n
e
c
a
b
g
h

Fig. 1

r
f

Fig. 2

the pin **d** of the fork 148 cannot follow the slot of the lever 150 because being prevented by the wing **n** of the lever 150'. The pin **d** is then lowered thus remaining in the position concerning the wheel 149 corresponding to the single line-spacing. Since in the printing cycles not preceded by extra-cycle the lever 150' is not moved, the line-spacing will be a simple one notwithstanding the lever 150 is placed on the double line-spacing position.

During the extra-cycle which presets a total cycle, when the plate 196 rotates the arm 198 in the direction of the arrow, the arm 210 integral with it through the spring 278, rotates the bridge 276. This latter rotates at its turn the lever 150' in the direction of the arrow releasing the upper end of the fork 148 from its wing **n**. The pin **d** can follow now the slot **e** of the lever 150. It moves therefore to such a position with respect to the wheel 149, that when the fork 148 is lowered, the hooking of the pin **d** to the wheel 149 is anticipated by one tooth. After the printing of the total, the double line-spacing is performed. The double line-spacing is naturally performed in every cycle preceded by an extra-cycle and therefore in the memory reading cycles also (Chap. XXIV).

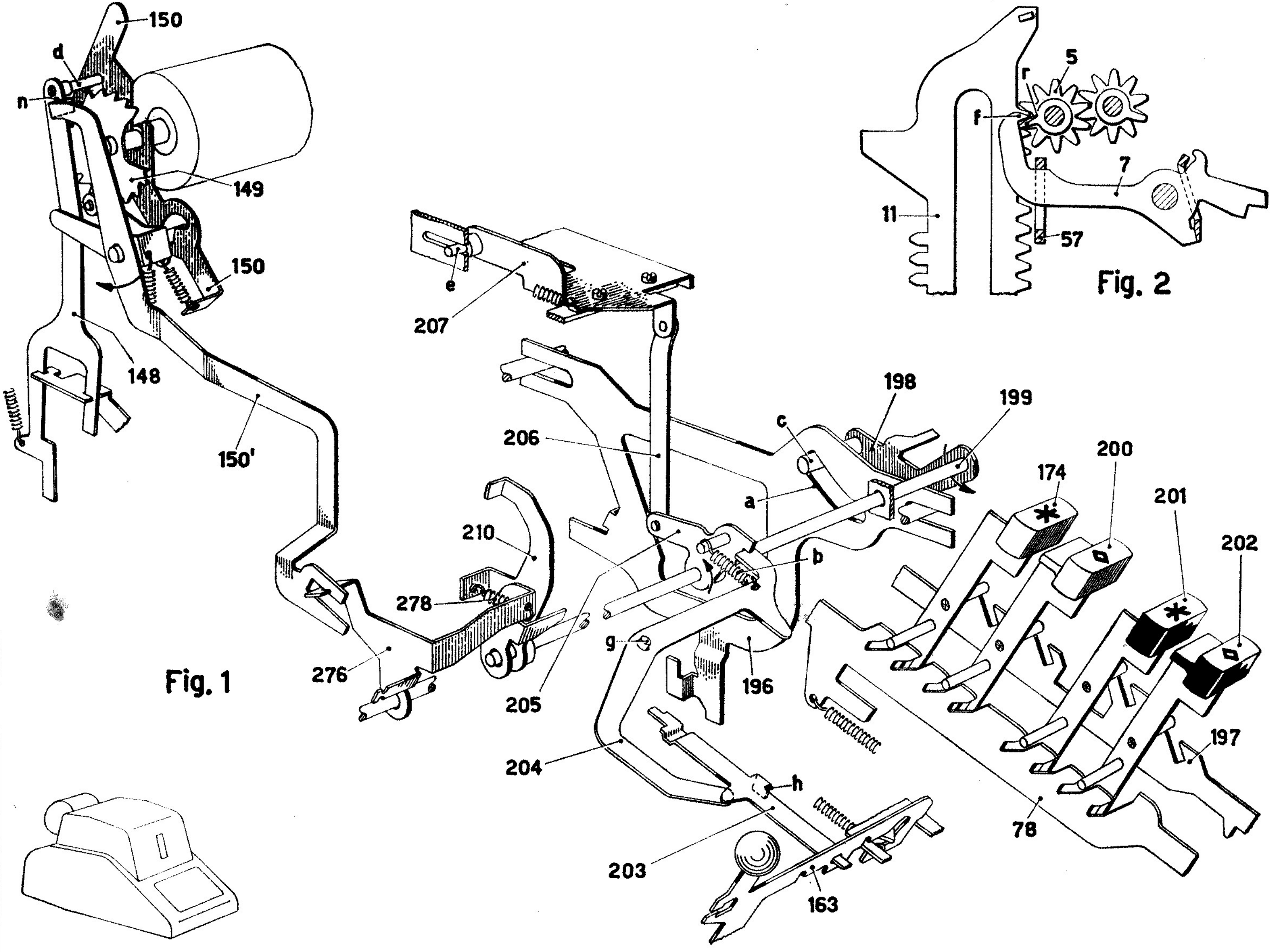

d
n
e
c
a
b
g
h
r
f

Fig. 1

Fig. 2

b) *Presetting extra-cycle.*

4. *Inversion of the registers.* By depressing one of the total keys, the plate 196 moves backward rotating the shaft 199 in the direction of the arrow. The arm 210, integral with the shaft 199 then moves backward the plate 111 which controls the inversion of the registers. This is done to modify if necessary the position of the register from which the total come off before the cycle begins and according to the sign of the balance to be discharged. The movement of the plate 111 during the extra-cycle serves also to modify if necessary the position of the register in which we enter the total discharged from the other register, thus replacing the movement of the plate 111 which is performed in the first part of the cycle in the other non-total cycles (Chap. VII).

We have seen (Chap. VIII) that in case of a positive balance the wheels to be actuated are the adding wheels **A**, while in case of a credit balance we use the subtracting wheels **S**. By depressing one of the total keys 201 or 202 concerning the second register, the pins **c**, or **d**, move the credit balance slider 209 backward. This latter rotates the bridge 208 in the direction of the arrow moving therefore backward the stays 118 and 123.

We have seen at Chap. VIII, par. *b*), that the position of the stay 118 indicates the balance sign contained in the second register. If this balance is positive the extension **e** of the stay 118 doesn't engage with the wing **f** of the arm 119, while the wing **t** of the same stay 118 is above the extension **s** of the bridge 124. When the stay 118 moves backward it doesn't influence the lever 119 nor the bridge 124. The second register, from which the total comes off is then preset in adding position while the first register can be preset in subtraction by its own subtraction key, in adding position in all the other cases.

If, on the contrary, the balance of the second register is negative, the stay 118 is lowered with the extension **e** engaged with the wing **f** and the wing **t** in front of the extension **s**. When the stay 118 is moved backward, its extension **e** rotates the arm 119 together with the arm 104 in the direction of the arrow, thus presetting the inversion of the second register in subtraction (Chap. VII). The wing **t** of the stay 118 rotates at the same time the bridge 124 in the direction of the arrow; consequently the wing **r** rotates the arm 127 together with the arm 107 to preset the inversion of the first register in subtraction. The inversion of the two registers is made afterward in the extra-cycle when the arm 210 pushes the plate 111 together with the two anchors 103 and 108 backward.

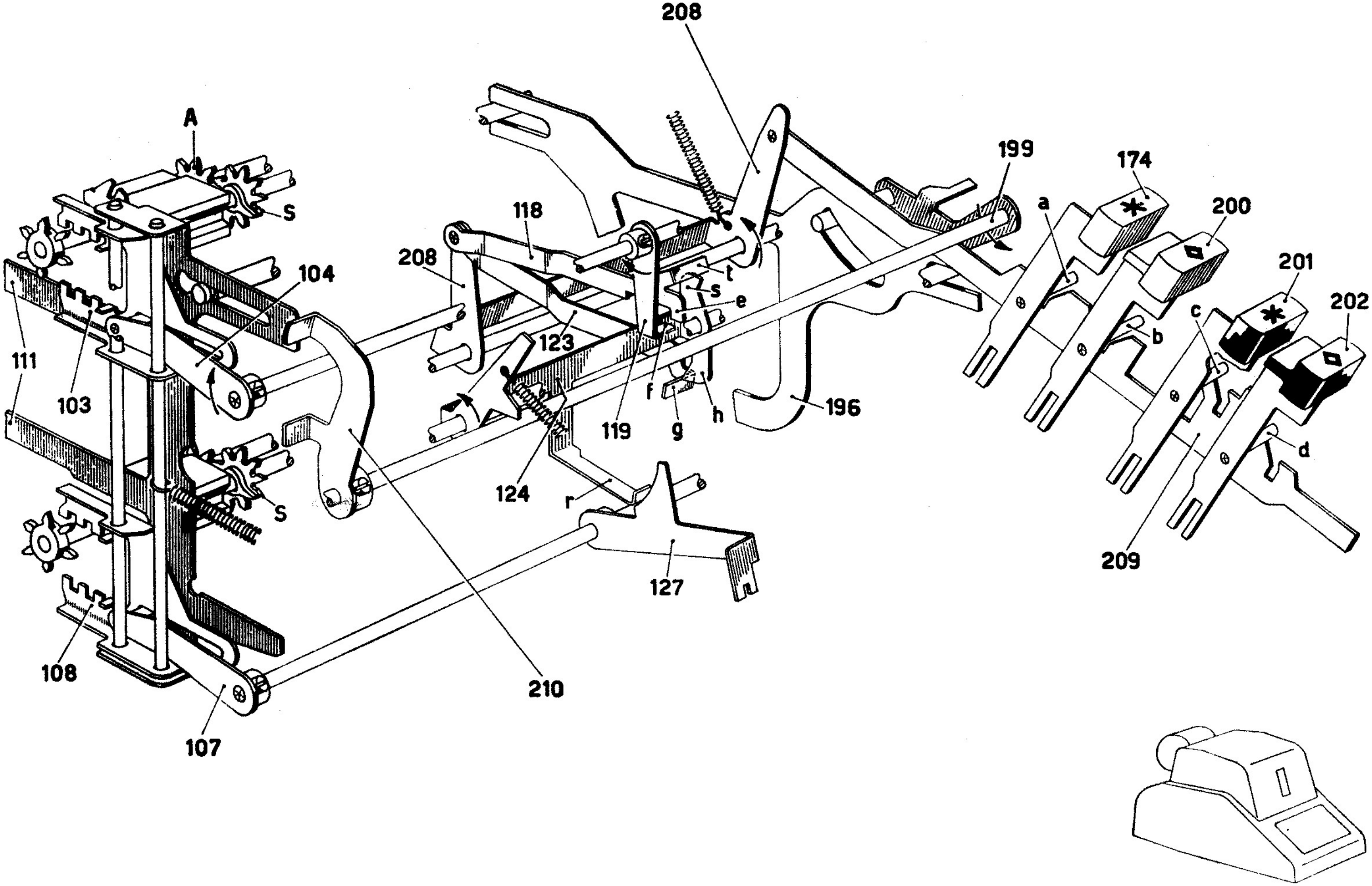
Concluding, by transferring a total from the second to the first register:

— if the total is positive, it is transferred with the sign corresponding to the key depressed of the first register;

— if the total is negative, it is transferred in the first register always negatively even if we depress the add key of the first register.

The grand total of the second register can also be transferred algebraically to the first register by depressing the total key 201 only after having set the accumulation slider as we shall see at Chap. XLI.

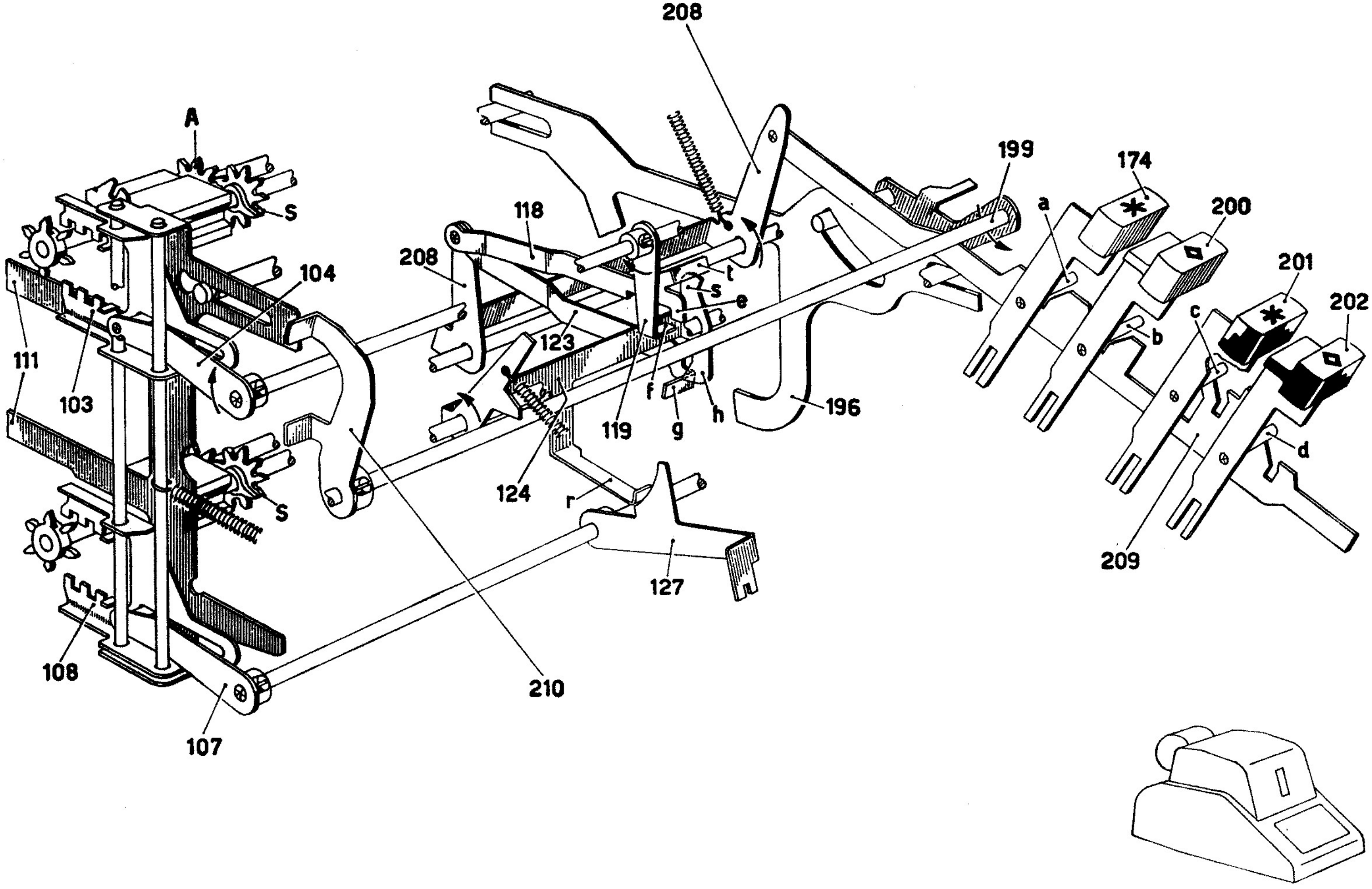
By depressing one of the total keys 174 or 200 of the first register, the pins **a**, or **b**, move the credit balance 209


208
A
S
199
174
a
118
200
208
104
t
s
e
201
202
c
b
111
123
103
f
196
119
g
h
d
124
S
r
209
127
108
210
107

forward. The slider 209, by means of the bridge 208, move therefore the two stays 118 and 123 forward. As we have seen at Chap. VIII, par. *b*), the position of the stay 123 indicates the sign of the balance contained in the first register. If this balance is positive, the wing **g** of the stay 123 is under the extension **h** of the bridge 124. When the stay 123 moves forward, it doesn't influence the bridge 124 and the first register is preset in adding position.

If, on the contrary, the balance is negative, the wing **g** of the stay 123 is behind the extension **h** of the bridge 124. When the stay 123 moves forward it rotates the bridge 124 in the direction of the arrow thus presetting the inversion of the first register in subtraction, as seen above.

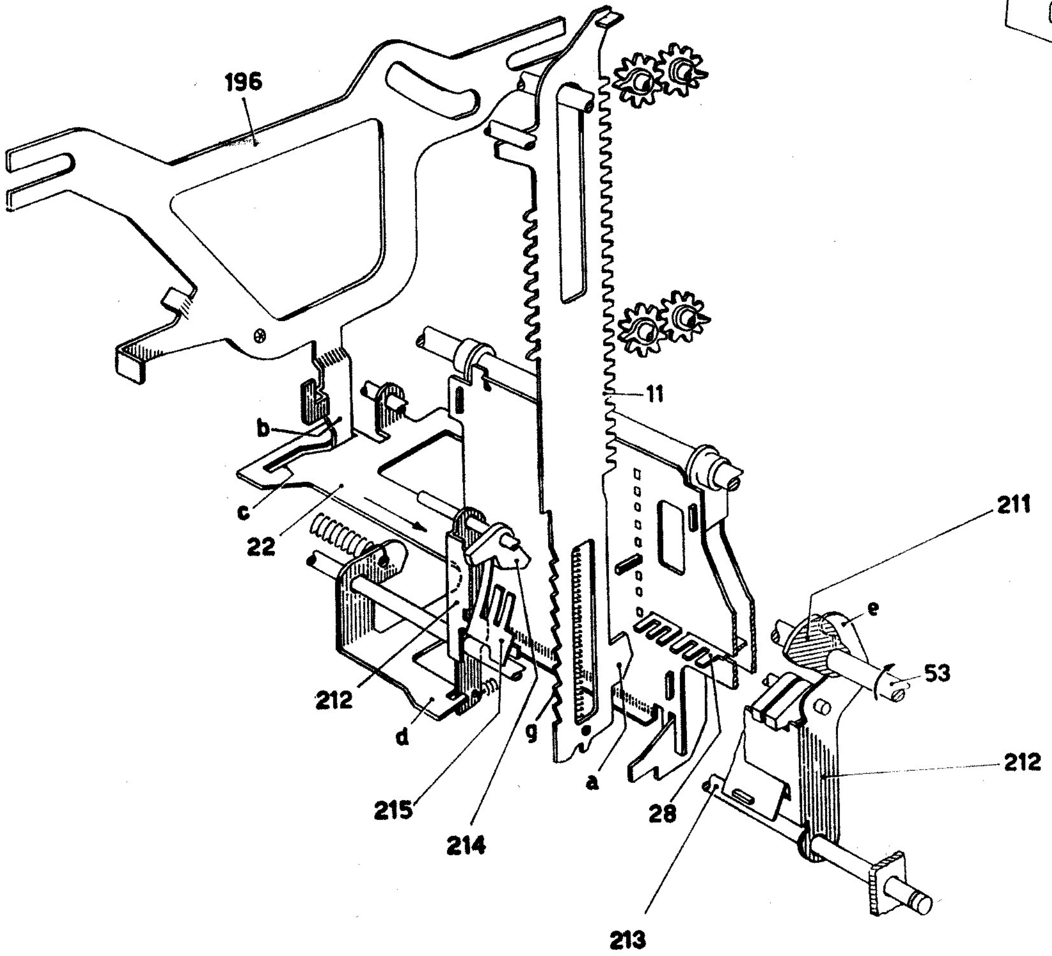
Whenever we wish to transfer a total from the first to the second register, it is always transferred with the sign coresponding to the key depressed of the second register.

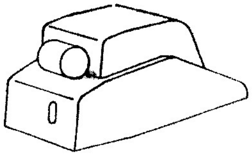

208
A
S
118
104
208
199
174
a
200
201
202
111
103
123
t
s
e
f
g
h
119
196
b
c
d
124
r
S
127
209
108
210
107

b) *Presetting extra-cycle.*

5. *Slide half-step.* During the backward motion of the plate 196 (to the left in the figure), its extension **b** acts on the cam-slot **c** of the slide escapement base plate 22, moving the slide half-step in the direction of the arrow. The teeth of the cypher plate 28 and any stop set move therefore out of the trajectory of the lug **a** of the executers 11 so that to let them pass between the teeth of the plate 28 and between the columns of stops of the slide.

As we have already explained in the par. *a*), during grand total the register is disengaged from the executers around the middle of the cycle. To avoid then that the executers trip upward, they are locked in the position reached by a set of small pawls 214 carried by the frame 212 and held in the position illustrated in the figure by the leaf spring 215. This is why when the base plate 22 is moved by half-step, its wing **d** drags the frame 212 which moves its extension **e** on the plane of the cam 211 of the main shaft 53 and the pawls 214 in connection with the executers 11. During the cycle, the frame 212 will be rotated by the cam 211 so that the pawls 214 engage with the rear teeth-range **g** of the executers 11 to prevent them tripping upward (see also par. *c*).


b
c
e
d
g
a



b) *Presetting extra-cycle.*

6. *Selection of the register.* The two engagement control sliders 74 and 92 are resting normally against the crank 75 (see also Chap. VI). They are also controlled by the wings **e** of the levers 217 and 216.

When depressing one of the total keys 201 or 202 of the second register, the respective pins **h**, **i** rotate in the direction of the arrow the lever 217 which carries the wing **e** under the exstension **f** of the slider 74. When during the extra-cycle the arm 198 rotates in the direction of the arrow actuated by the plate 196, the crank 75 integral with the arm 198 releases the two sliders 74 and 92. The slider 74 can therefore move backward until the slider 69 connected to it rests with the step **g** against the small plate 68, while the slider 92 stops immediately with its extension **f** against the wing **e** of the lever 216.

On the contrary, when depressing one of the total keys 174 or 200 of the first register, we rotate the lever 216 which releases the slider 92 while the slider 74 stops immediately against the wing **c** of the lever 217. That of the two sliders 74 or 92 which moves backward presets the engagement of the respective register for total, as we shall see hereafter.

c) *Cycle of total.*

We have seen at Chap. XVI that at the end of the extra-cycle the clutch of the main shaft 53 is closed and the true cycle of total begins.

1. *Total in the second register.* When the key 201 has been depressed, the wing **e** of the lever 217 has moved to the hachured position illustrated in the figure 2. During the extra-cycle, the slider 74 has moved backward raising, through the bridge 70, the stay 72. Furthermore, the pin **h** of the key 201 has also moved on the trajectory of the step **t** of the slider 74.

During the first part of the cycle, the small plate 68 rotates in the direction of the arrow **A** pushing forward the slider 69. This latter is followed by the slider 74 until its step **t** stops against the pin **h** of the key 201, lowering therefore the stay 72.

As we shall see in the next page, the pins **c** and **d** are actuated vertically and synchronized with the plates 66 and 67 so that:

— at 20° of the cycle the plate 67 pushes the connecting rod 73 forward thus performing the engagement of the register with the executers;

— at 170° of the cycle, the plate 66 moves rest the connecting rod 73 back to thus disengaging the register from the executers.

At 25° of the cycle, the executers start moving up and rotate the register wheels backward. Each executer stops when the proper wheel is stopped at zero (par. *a*). At 134°, the printing of the total is performed in the same way as described in the Chap. IX.

At 170° about of the cycle, the small pawls 214 (see precedent page) are engaged with the executers thus avoiding them tripping upward when the register disengages. At the end of the cycle, the slider 69 of the second register moves back and rests first of all with the extension **g** against the plate 68. Then, when the plate 196 moves back to rest it rotates the crank 75 in the direction opposite to that of the arrow and moves the slider 74 together with the slider 69 forward to the position illustrated in the figure 1.

2. *Sub-total in the second register.* It differs from the total only because of the register disengagement. By depressing the key 202, the lever 217 is rotated in such a way to carry its wing **e** on the trajectory of the step **k** (dotted position in the figure 2). During the cycle, the slider 74 is now

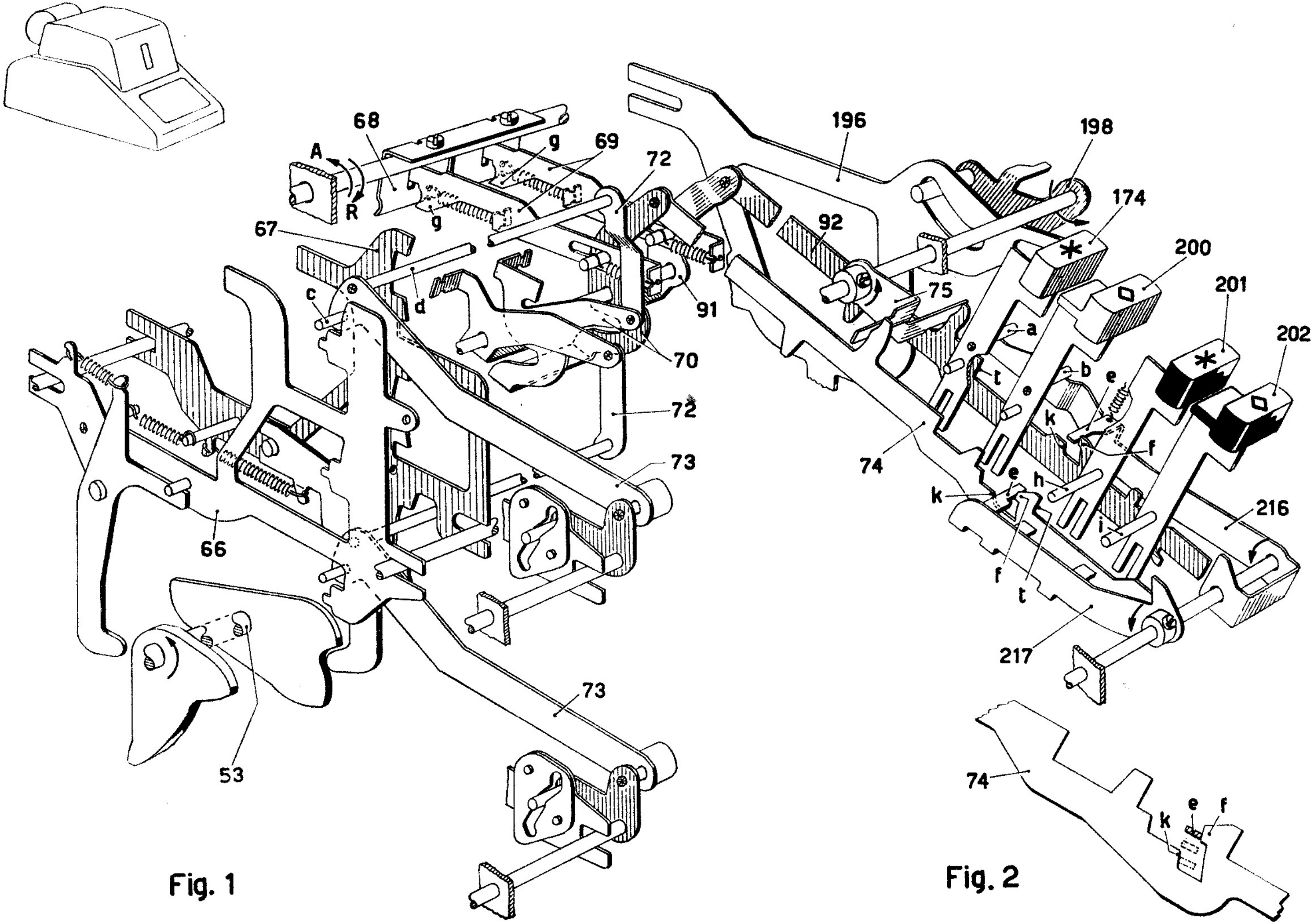

68
A
R
g
69
72
196
198
174
67
g
92
200
c
d
75
201
91
a
202
70
b
e
72
l
k
f
73
74
e
h
k
216
66
i
f
t
217
73
53
74
k
e
f

Fig. 1

Fig. 2

stopped by the wing **e** after a forward travel shorter than in the precedent case, thus presetting the disengagement of the rigister from the executers after they have moved back to rest (see the following paragraph).

3. *Total in the first register.* By depressing the key 174 its pin **a** pushes downward the lever 216 which carries its wing **e** off the trajectory of the extension **f** of the slider 92; it also moves on the trajectory of the step **t** of the slider 92. At the beginning of the cycle, the first register is engaged with the executers and at half cycle it is disengaged from them in the same way as we have seen for the second register.

4. *Sub-total in the first register.* By depressing the key 200 the lever 216 is lowered in such a way to bring its wing **e** on the trajectory of the step **k** of the slider 92.

The forward travel of this slider will be shorter than in the precedent case and the register will be disengaged from the executers only at the end of the cycle, in the same way already seen for the second register.

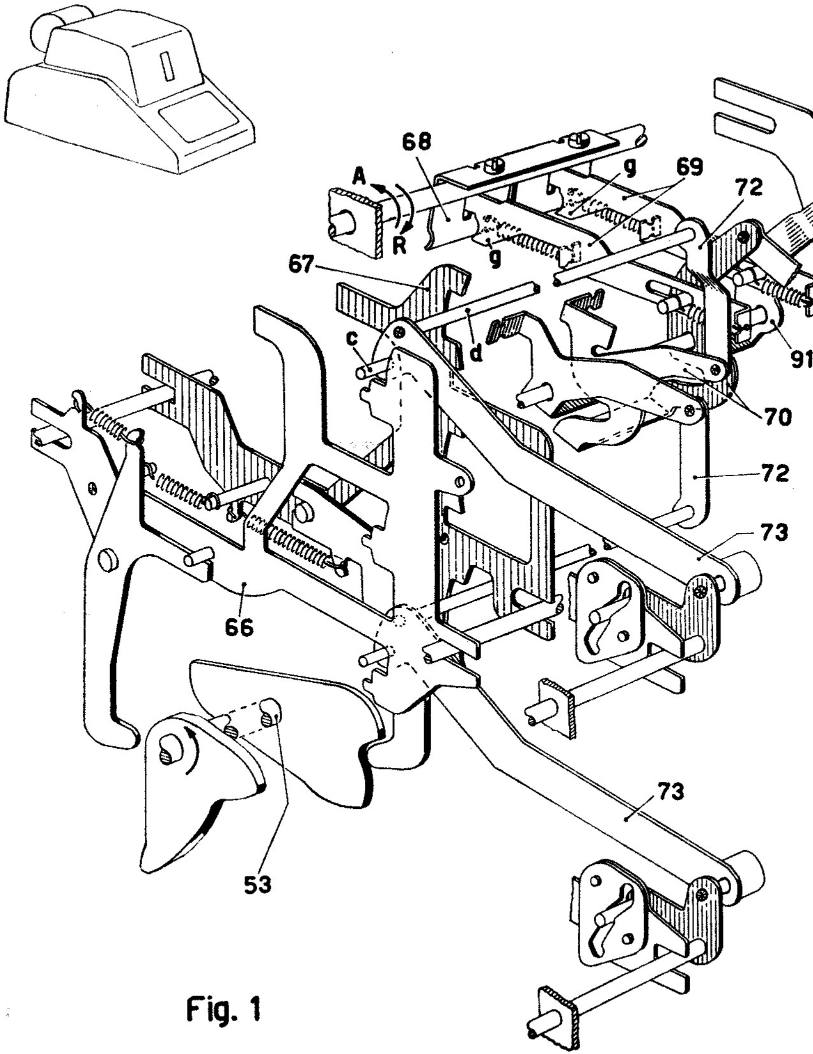

A
R
g
g
c
d

Fig. 1

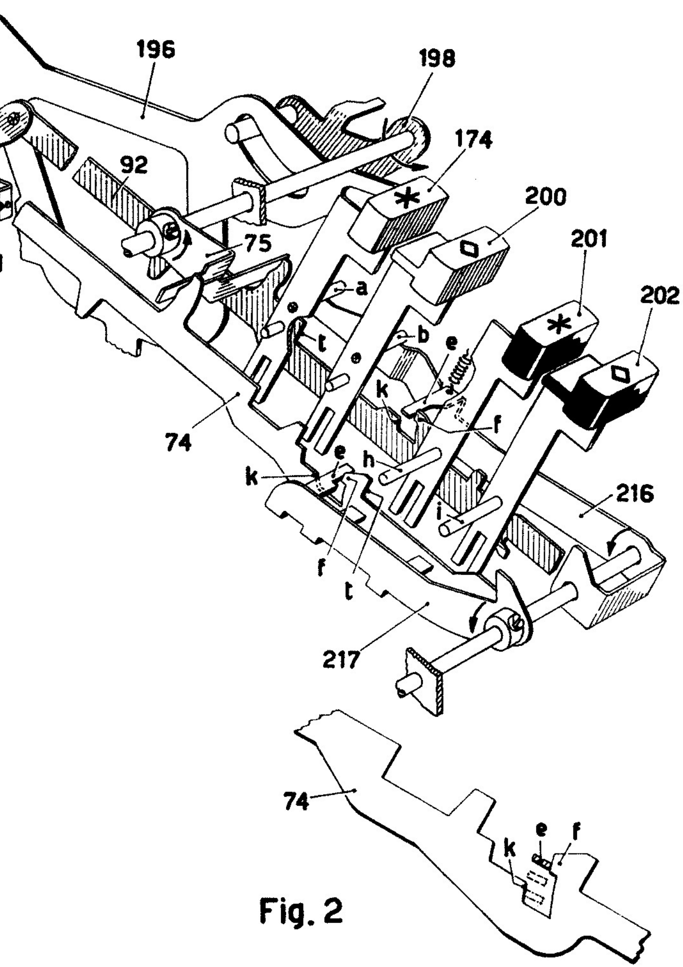

196
198
174
92
200
75
201
a
202
t
b
e
k
f
74
e
h
k
i
216
f
t
217
74
e
f
k

Fig. 2

c) *Cycle of total.*

5. *Register engagement and disengagement control during total.* We shall now illustrate in detail this control concerning the first register; it is similar to that of the second register.

We have seen precedently that during the extra-cycle the pins **c** and **d** of the connecting-rod 73 move upward. The pin **d** gets then placed on the trajectory of the step **u** of the plate 67 (figure 2) covering the segment **AB**.

At 20° about of the cycle of the main shaft 53, the lobe **e** of the cam 89 (fig. 1) pushes forward (to the right in the figure) the plate 67 and the step **u** drags the pin **d** wich coverts the segment **BC** (figure 3). The connecting-rod engages in this way the register with the executers.

During the upward movement of the executers the pins **c** and **d** are displaced downward (precedent page). Since the total key has been depressed, the pin **c** of the connecting-rod 73 is carried on the trajectory of the step **v** of the plate 66, hile the pin **d** moves in front of the opening **f** of the plate 67 (figure 4). The pins **c** and **t** thus cover the segment **CD**.

At 170° of the cycle, the lobe **n** of the cam 90 pushes the plate 66 backward and its step **v** drags the pin **c** of the connecting-rod 73 which disengages the register from the executers. The pins **c** and **d** cover the segment **DE** (fig. 5).

The lobes **m** and **q** of the cam 89 (fig. 1) don't influence the register because when they move the plate 67 forward, the pin **d** is in connection with the opening **f**. During the downward movement of the executers, the pins **c** and **d** cover the segment **EA** (fig. 5) thus returning to rest position. The lobe **p** of the cam 90 doesn't influence the register because when it moves the plate 66, the pin **c** is already in connection with the opening **s** of the plate.

6. *Register engagement and disengagement control during sub-total.* If we have depressed the sub-total key, the engagement of the register happens in the same way as ween for total (figures 2 and 3). Yet, during the cycle the downward movement of the pins **c** and **d** of the connecting-rod 73 is shorter than in case of total. At the end of the upward travel of the executers, the pin **q** of the connecting-rod 73 is therefore in connection with the opening **s** of the plate 66 after having covered the segment **CF** (fig. 6). Now, when the lobe **n** of the cam 90 (fig. 1) moves the plate 66, the pin **q** is not moved and the connecting-rod 73 doesn't disengage the register from the executers.

At the end of the return travel of the executers, the lobe **p** of the cam 90 compels the plate 66 to make a longer travel; this plate through the same opening **s** can at last bring the pin **c** to rest (fig. 6). This latter covers now the segment **FG**, thus disengaging the register from the executers.

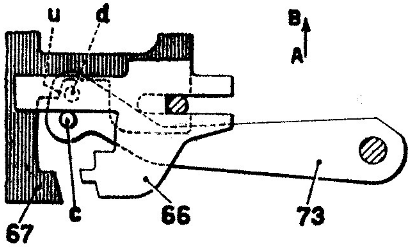

u
d
B
A
c
67
66
73

Fig. 2

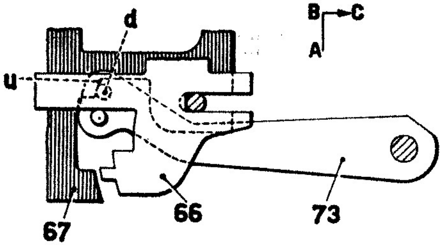

d
B
C
A
u
67
66
73

Fig. 3

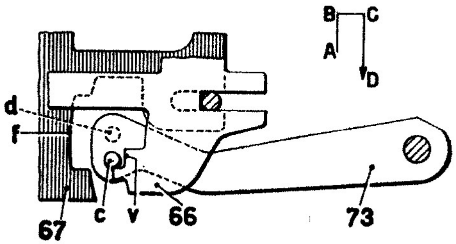

B
C
A
D
d
f
67
c
v
66
73

Fig. 4

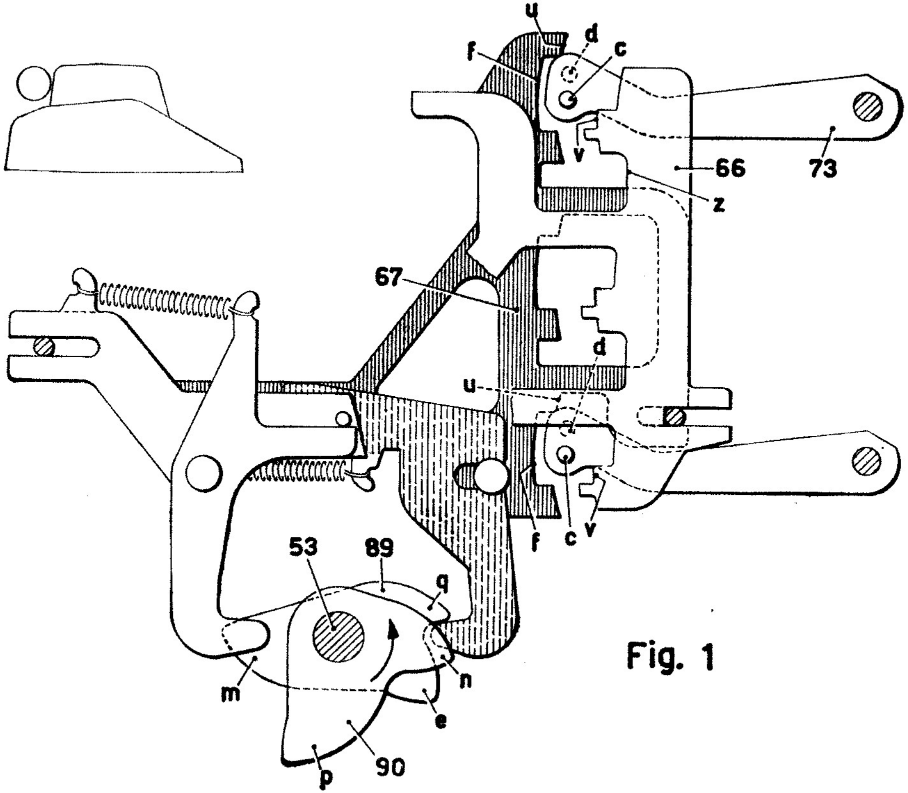

u
d
c
f
v
66
73
z
67
d
u
f
c
v
53
89
q
n
m
e
p
90

Fig. 1

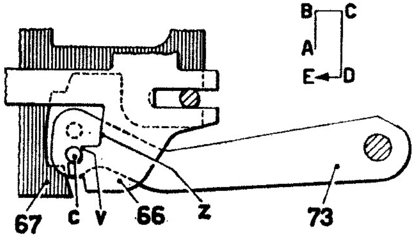

B
C
A
E
D
67
c
v
66
z
73

Fig. 5

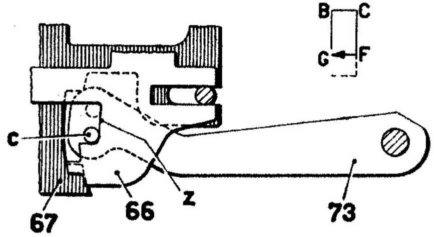

B
C
G
F
c
67
66
z
73

Fig. 6

XVIII - Special signs.

The special signs identify the sign and the nature of the figures printed and of the operations performed. They are printed at the right of the figures on two separate columns. The signs concerning the second register are printed on the right column; those concerning the first register on the left one. The credit balance sign is common to both registers and is printed between the figure of the units and the first register sign (see par. *c*).

All the second register signs are carried by the type-wheel 219 connected to the vertical slider 222. All those concerning the first register are carried by the type-wheel 218 connected to the vertical slider 224. In the figures 3 and 4 are schematically illustrated the signs carried by the wheels 219 and 218.

a) *Second register.*

We have seen at Chap. VI, par. *a*) and at Chap. XVII, par. *c*), that at every cycle the slider 74 (figure 1) moves forward and is stopped by the sub-total, total, subtraction and add key of the second register after a travel progressively longer. During this movement the bridge 70, by rotating in the direction of the arrow, rotates the bridge 221 which carries then, according to the rotation made, one of the steps **a**, **b**, **c**, **d**, on the trajectory of the wing **e** of the vertical slider 222. This latter is therefore stopped in connection with the special sign « **S** », « **T** », « **—** », « **+** », concerning the second register key that has been depressed (see fig. 3).

If during a cycle no operation is performed through the second register, the slider 74 moves, as we know, completely to thavel end. The slider 222 stops then while moving up against the fixed axle 223 thus presetting the wheel 219 to print the non-add sign « **<** »

The hook 220 is always engaged on the printing control plate 113 because the slider 222 doesn't include the wing **f** (Chap. IX, par. *a*). The slider 3 of the wheel 219 is released for printing at every printing cycle.

In addition to the signs already seen, the wheel 219 still carries the signs « **=** », « $\underline{\mathbf{x}}$ », « **:** » which are described in Part. II.

b) *First register.*

Similarly as seen above, at every cycle the slider 92 (fig. 2) moves forward and is stopped at a distance progressively longer by the sub-total, total, subtraction and add keys of the first register. During this motion, the bridge 91 rotates the bridge 225 which places one of its steps **g**, **h**, **m**, **n** on the trajectory of the wing **p** of the slider 224. This latter then presets the wheels 218 to print the special sign « **◊** », « **✱** », « **—** », « **+** », concerning the first register key that has been depressed (see fig. 4).

When no operation is performed through the first register, the slider 224 stops, during its upward travel, against the axle 223 thus presetting the printing of the non-add sign « **<** »

Since the slider 224 is supplied with the wing **f**, the hook 226 can engage with the printing control stay 113 only when the slider 224 has mowed at least one step upward. The slider 3 of the wheel 218 is therefore released only during the printing cycles in which the slider 224 moves upward (Chap. XXXI).

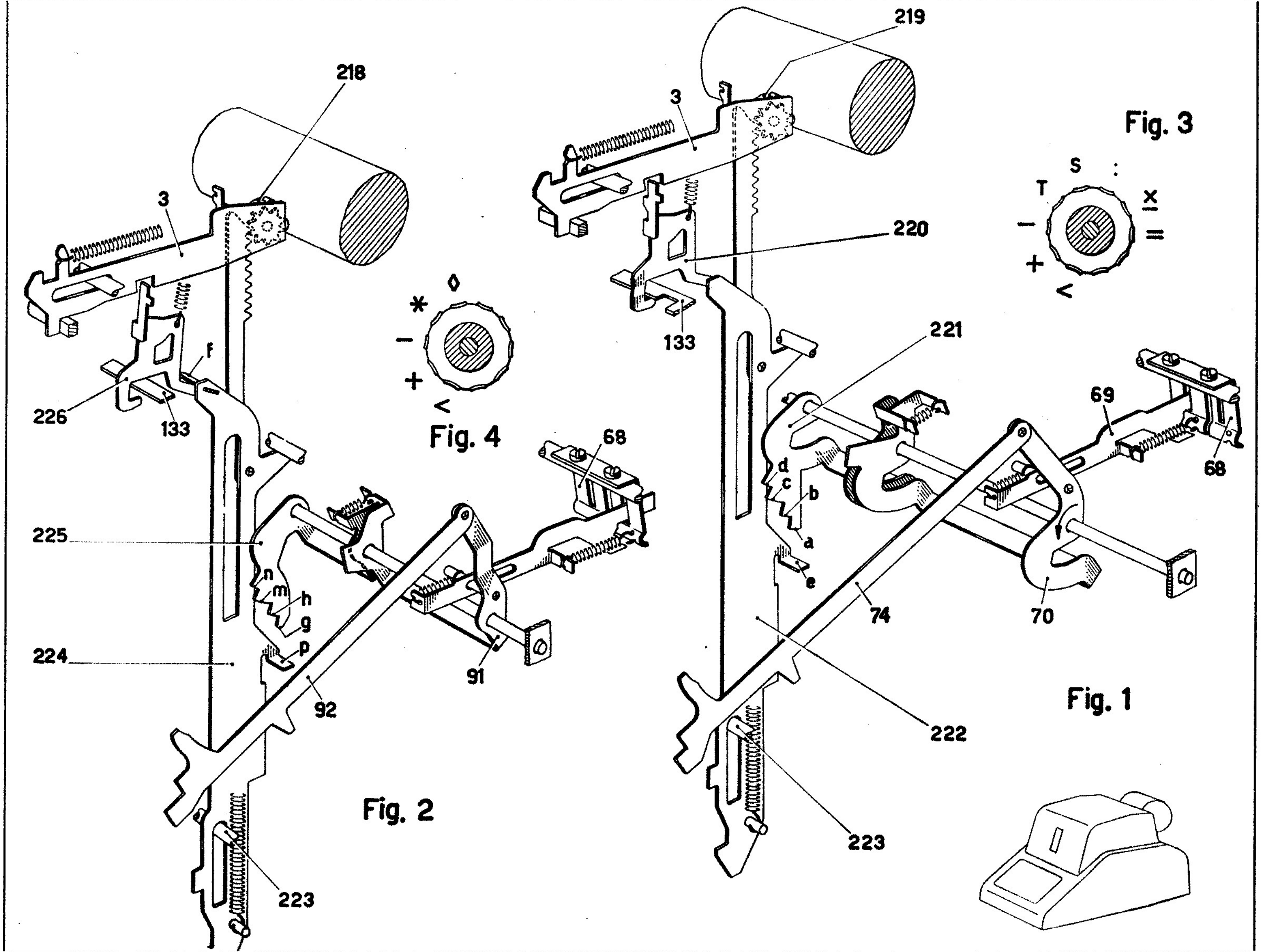

218
3
226
133
f
225
n
m
h
g
p
224
92
91
68
223
◊
*
−
+
<
219
3
220
133
221
69
68
d
c
b
a
e
74
70
222
223
S
:
T
×
−
=
+
<

Fig. 2

Fig. 4

Fig. 3

Fig. 1

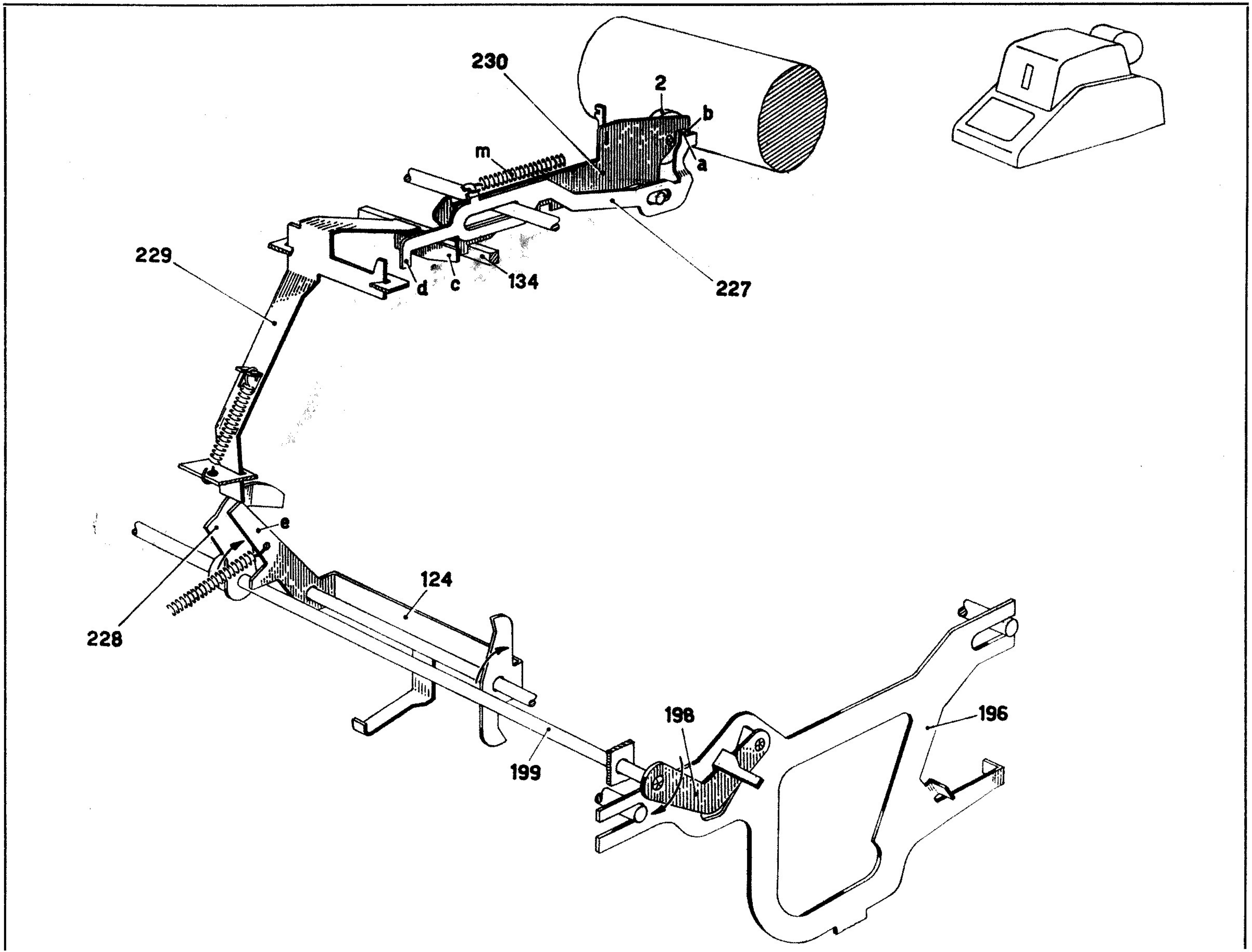
c) *Credit balance sign.*

In the cycles of total in which a credit balance is released from the second or the first register, the machine prints the sign « **c** » between the figure of the units and the first register sign.

This is why on the units printing slider 230 there is, fitted by pivot and slot, a slider 227 which extension **a** rests usually, thanks to its own spring **m**, aginst the extension **h** of the slider 230. In the cycles in which no total is wanted, when the universal bar 134 moves backward, the spring **m** flings against the platen the slider 227 together with the slider 230. Yet, in the last part of the travel, the wing **c** of the hook 229 stops the extension **d** of the slider 227 which don't strike the platen, while the slider 230 continues by inertia printing therefore the figure of the units.

As we have seen at Chap. XVII, par. *b*), that when depressing a total key, the bridge 124 is always rotated in the direction of the arrow either a credit balance is released from the second register than from the first register. Furthermore, during the extra-cycle of total, the plate 196 rotates, by moving backward, the arm 198 together with the arm 228 integral with the former in the direction of the arrow thus releasing the hook 229.

If the total printed is positive the hook 229 is immediately stopped by the arm **e** of the bridge 124; consequently the wing **c** prevents the slider 227 to strike the platen. If, on the contrary, the balance printed is negative the bridge 124 is rotated in the direction of the arrow and the arm **e** doesn't stop the hook 229. The wing **c** of this latter then releases the slider 227 which can now make all its travel and strike the platen together with the wheel 2, thus printing the credit balance sign « **c** ».


b
m
a
d
c
e

XIX - Ribbon movement.

a) *Ribbon advance.*

The two ribbon spools 231 (fig. 2) are carried by a support having two plates 207. This support moves horizontally along the slots **a** of the fixed side-plates 236. Each spool engages with the wing **h** of a perforated disc 238 (fig. 1) and the two discs advance alternatively to wind the ribbon on one of the spools.

This is why the small pawls 233 and 237 controlled by the rocker 235 can engage in the two discs 238. This rocker is pivoted on the fixed pivot **b** and always takes, thanks to the stabilizer 234. such a position that one of the two small pawls (the pawl 237 in the figure 1) is engeged with the openings of the corresponding disc 238, while the other (the pawl 233 in the figure 1) is held out of engagement of the wing **c** of the rocker 235 which actuates the lug **d** of the pawl.

The spools support moves at every cycle toward the platen 1 actuated by the two connecting-rods 129; each connecting-rod engages with the pin **e** of the corresponding plate 207. In the first part of the cycle, the pawl engaged skips on the openings of the disc 238 which follows the movement of the support. In the second part, when the support returns back, the pawl engages on the contrary with an opening and rotates the disc by one step together with the spool thus performing the ribbon advance.

b) *Ribbon reverse.*

The arm 232 pivoted on the corresponding plate 207 rests on the ribbon winded on each spool. When the thickness of the ribbon winded on one spool (the right spool in the figure 1) is quite void, during the return motion of the spools support, the respective arm 232 actuates the extension **g** of the rocker 235 rotating it and releasing therefore the wing **c** of the lug **g** of the small pawl (the pawl 233 in the figure 1). The pawl 233 engages now with the proper disc 238; consequently the right spool will be the driver; the ribbon movement will reverse.

c) *Printing in black.*

As we have seen above, the connecting-rod 129 moves at every cycle the spools support toward the platen 1. When the printing takes place, the ribbon gets placed consequently in front of the platen, ready to print in black.

d) *Printing in red.*

During all the cycles in which we have first of all an extra-cycle (Chap. XVI), as for instance in those of total, the printing is performed in red, as already said in the Chap. XVII, par. *b*). This is why when during the extra-cycle the arm 198 rotates in the direction of the arrow actuated by the plate 196, the crank 205 rotates, through the stay 206, the spools support around the pins **e**. In the figure 3 the spools support is illustrated in this position where the printing is performed in red.

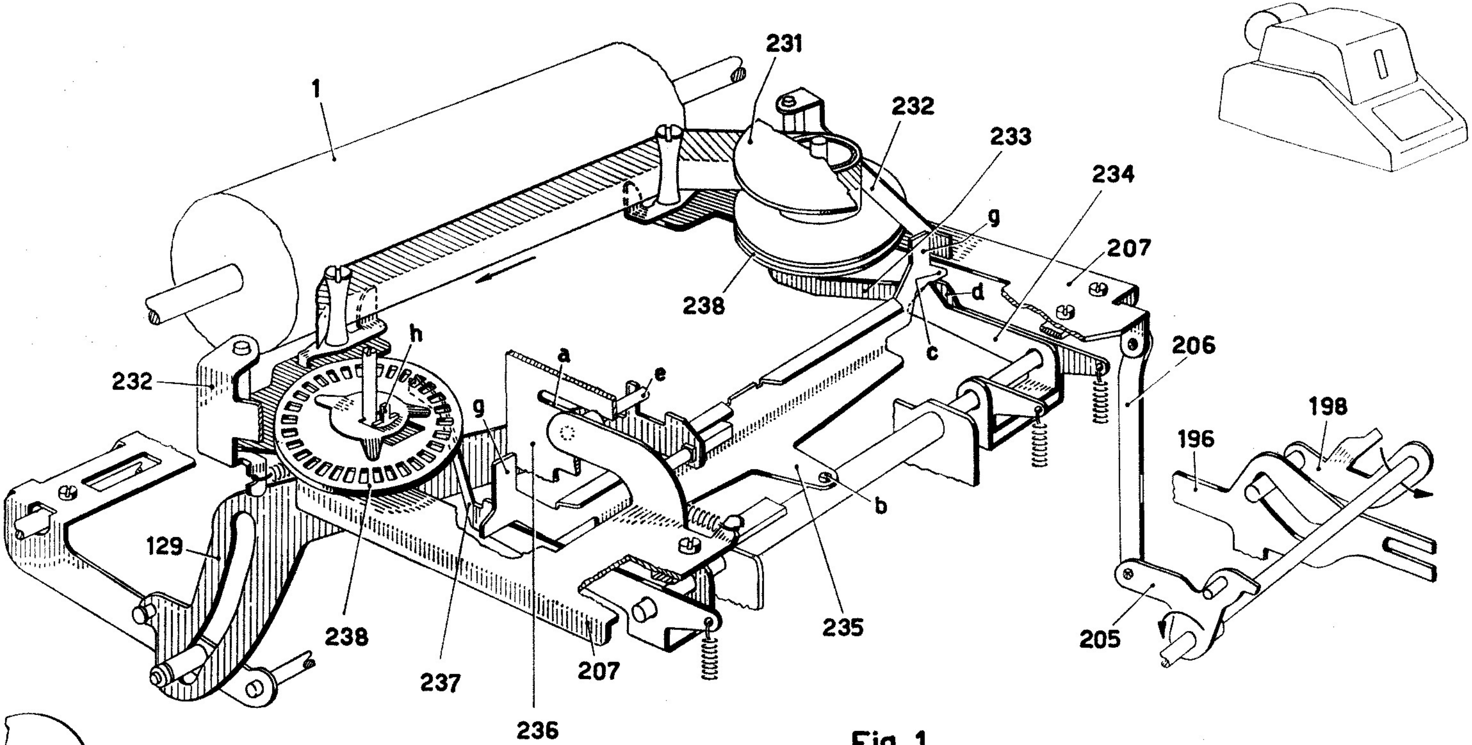

231
1
232
233
234
207
g
238
d
h
232
a
e
c
206
g
198
196
129
b
238
235
205
237
207
236

Fig. 1

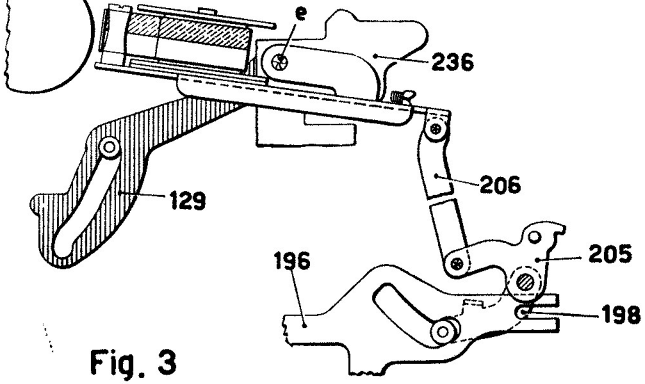

e
236
206
129
205
196
198

Fig. 3

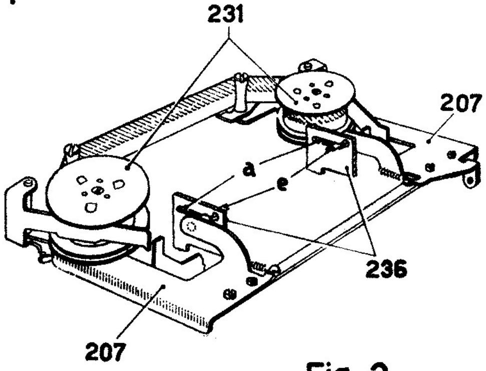

231
207
a
e
236
207

Fig. 2

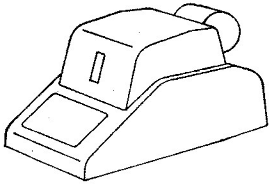
XX - Paper-tape holders and paper guide plate.

The paper-tape-roll is fitted between the pins **a** of the two arms 239 and 240 (fig. 1) which are running horizontally and pushed one against the other by the springs **b** and **c**.

The tape is guided down by the paper-feed made by a special plate 243 (fig. 1) centered by means of two wings **d** on the internal side-plates of the machine, and by the front paper-feed rollers 244 and also by the rear one 245 of the special plate 243. The paper-feed is pushed against the platen 1 by the arm **e** of the bridge 241 actuated by the spring **f**. By actuating the arm **g** of the bridge 241, this latter rotates in the direction of the arrow thus releasing the tape from the paper-feed.

The tape is guided up between the fixed bar 242 and the plate 247 which prevents that the paper might be winded on the platen after printing.

The plate 246 turns on the bar 242 and has an indented rear edge to cut the tape. Furthermore it is also supplied with the extensions **h** which indicate the decimal position of the printed figures. This is why the plate 246 can have on the bar 242 six position established by the notches **m**.



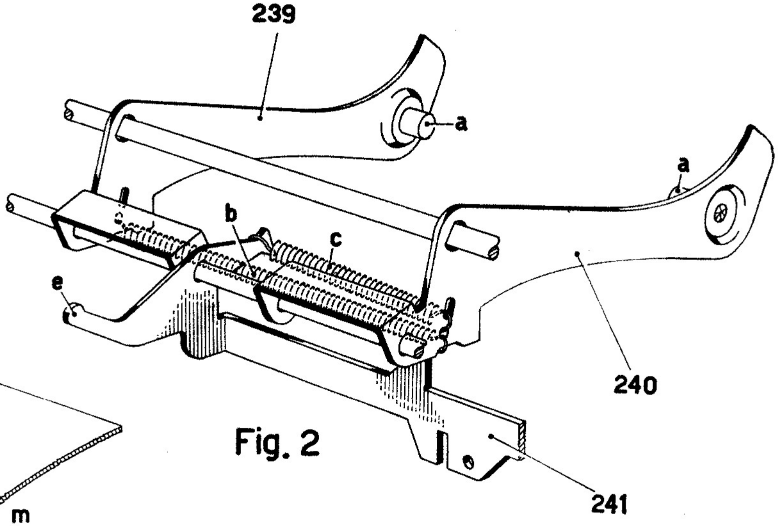

239
a
a
b
c
e
240
241

Fig. 2

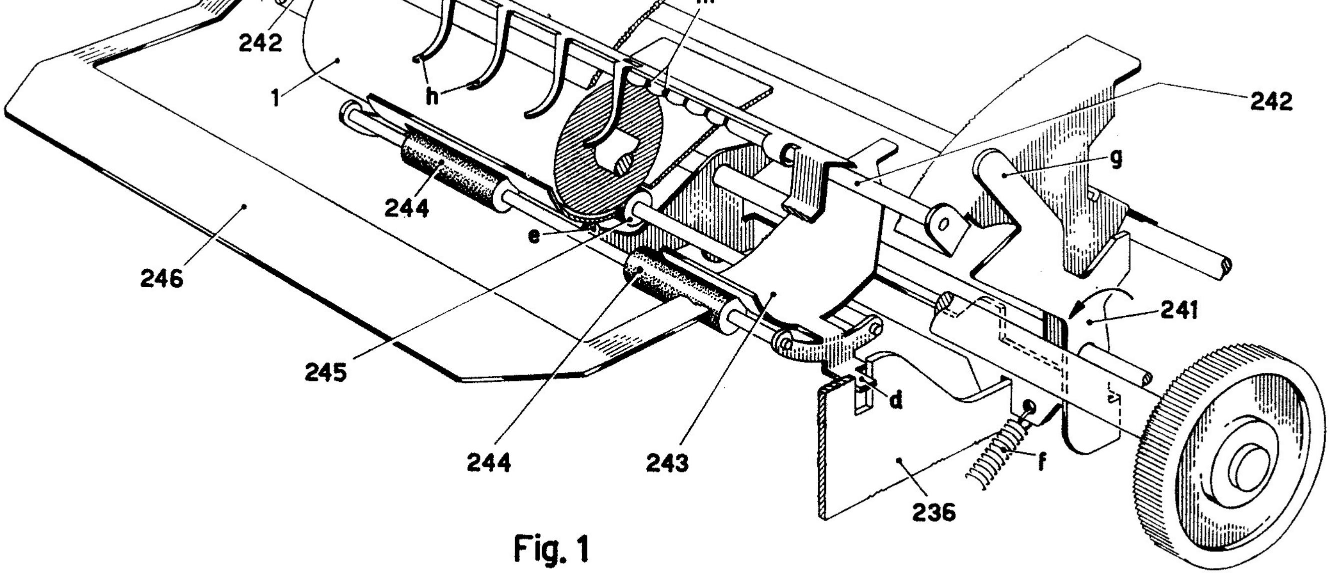

m
h
g
e
d
f

Fig. 1

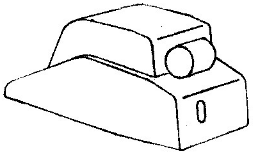
PART II - MEMORY, MULTIPLICATION AND DIVISION

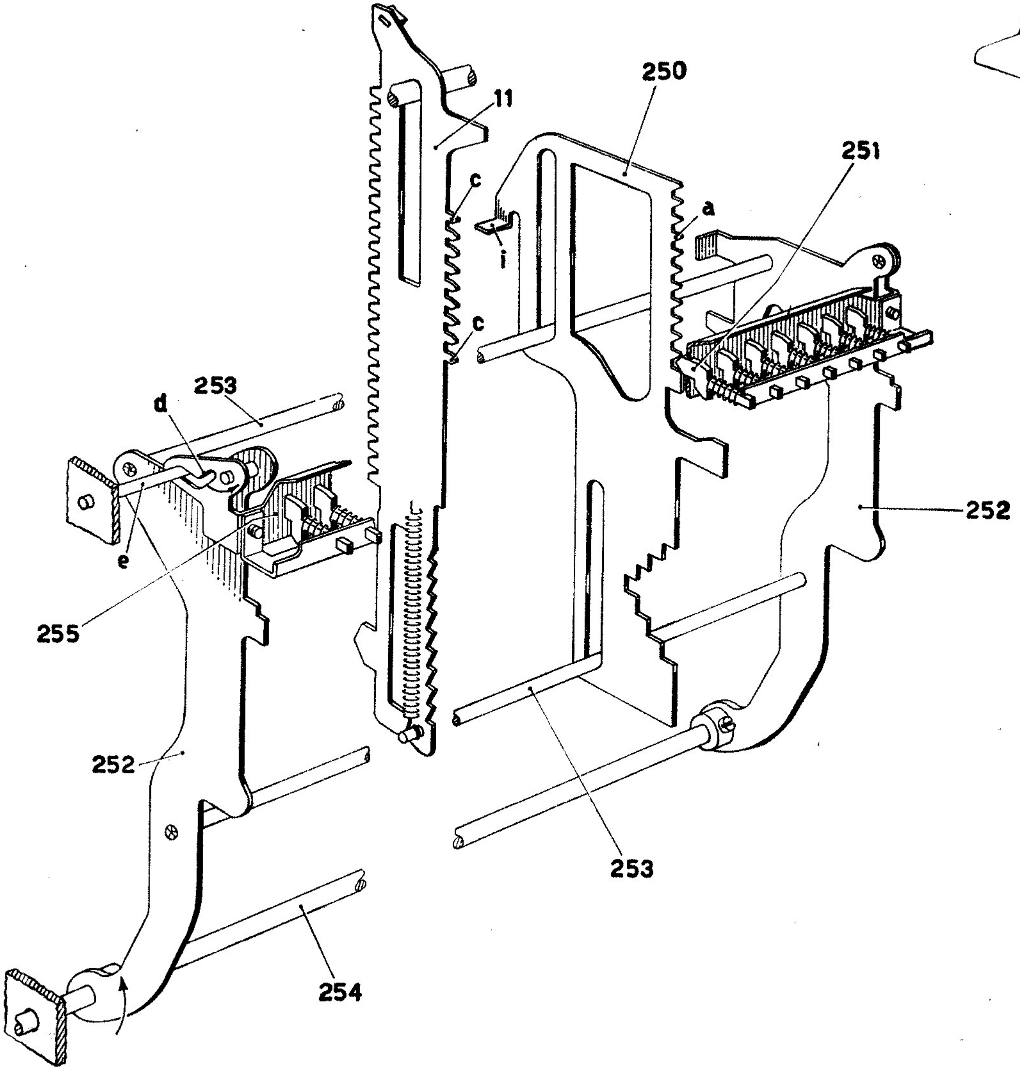
XXI - Memory.

The memory is the mechanism that serves to store any figure which can be the multiplier of the multiplication or the quotient of the division. The memory has twelve vertical racks 250 one for each column of stops of the slide. These racks are placed behind the corresponding executers 11 (see also Chap. XXVII) and run vertically on two axles 253 which are supported by two side-plates 252 fixed on the shaft 254. Each rack can take ten different vertical positions corresponding to the digits from zero to nine and is held in every position by a spring-stabilizer 251 which engages with the teeth **a** of the rack 250. The stabilizers 251 are carried by a frame 255 pivoted on the side-plates 252.

By rotating the side-plates 252 in the direction of the arrow, all the racks 250 together approach the executers 11 and each rack 250 engages its wing **i** with the rear teeth **c** of the corresponding executer 11. Furthermore, the slot **d** of the frame 255 guided by the fixed pivot **e**, rotates the frame 255 in the direction of the arrow thus disengaging the stabilizers 251 from the racks 250. These become therefore integral with the executers 11 by which they are actuated. In a calculating cycle we can therefore input in the racks 250 any figure entered in the slide, while in a total cycle we can input the total released from a register. Vice versa, the figure stored in the racks 250 can be transferred to the executers 11 and to one of the two registers during a calculating cycle.

If, when the memory is engaged with the executers 11, a rack 250 is at « 9 », its wing **i** is under the lower tooth **c** of the corresponding executer. When the executers 11 rise, the racks 250 that are at « 9 » are not therefore dragged upward, while the corresponding executers 11 stop all the same at « 9 », as we have seen at Chap. II.




c
a
i
c
d
e

XXII - Memory input.

A figure entered in the slide is input in the memory by means of a cycle during which the memory racks 250 engage with the executers 11. Normally in the printing cycles, the plate 137 stops, while moving forward, with the wing **a** against the arm **b** of the bridge 266.

By depressing the memory input key 264, the slider 267 moves backward and rotates the bridge 266 in the direction of the arrow, carrying therefore the arm **b** off the trajectory of the wing **a**. At the same time the hook 265 pivoted on the key stem 264 hooks the fixed plate 158 holding the key 264 down. If we start now a cycle of the main shaft 53, a first oscillation of the lever 269 actuated by the lobe **c** of the cam 268 is void. Then, when the wing **h** of the cam 140 leaves the lever 141, the plate 137 (Chap. IX) drags forward the slider 139 which, with its wing **d**, rotates the bridge 258 in the direction of the arrow. The wing **e** of the bridge 258 lowers therefore the anchor 256 moving the same to engage the pin **f** of the arm 257 fixed on the shaft 259.

At 134° of rotation of the main shaft 53, the executers 11 have reached the high position, corresponding to the figure entered which is printed on the paper (Chap. IX). At 170°, the lobe **g** of the cam 268 oscillates the lever 269 in the direction of the arrow. The anchor 256 is pushed forward and rotates, through the pin **f** in the direction of the arrow, the shaft 259 together with the lever 261 integral with the former. The lever 261, through the cam-slot **m** and te end **n** of the axle 262 fixed on the side-plate 252, rotates on the shaft 254 this same side-plate together with the racks 250 which, by means of their own wings **i** thus engage with the executers 11. The spring-stabilizer 260 holds the side-plate 252 in the position reached.

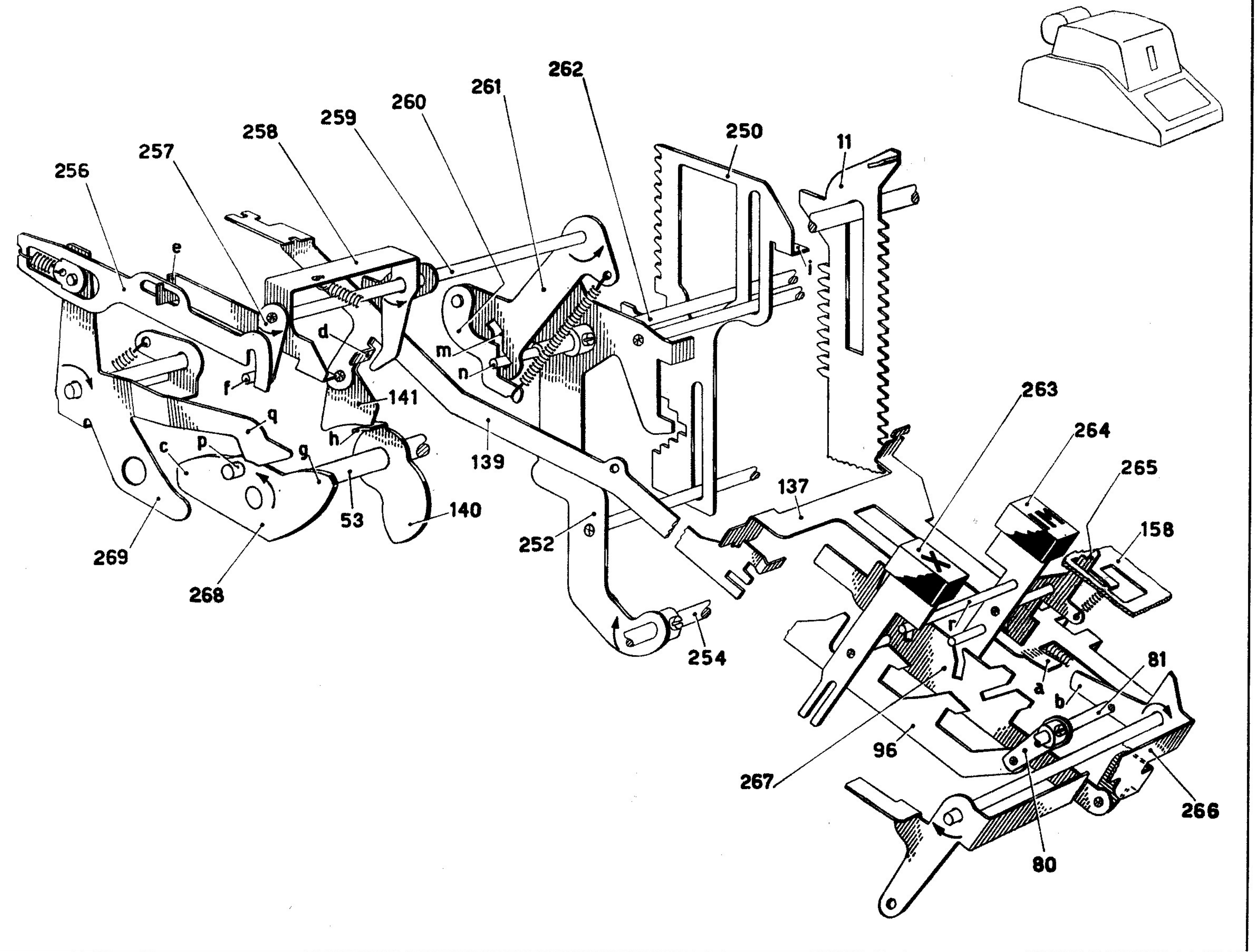
In the second part of the cycle, the executers 11 return to rest and drag downward the respective racks 250, each one a number of steps corresponding to the value of the figure entered; consequently, the figure is input in the memory from the executers. In the last part of the cycle, the pin **n** of the cam 268 actuates the arm **q** of the lever 269 moving it positively to rest position and disengaging the racks 250 from the executers through the anchor 256, the arm 257 and the lever 261. At last, when the cam 140, through the slider 139, moves the plate 137 back to rest, this latter rotates the hook 265 releasing it from the plate 158 and allowing the key 264 to return to rest.

The memory input key 264 is not a motor key but a presetting key only; consequently to start the input cycle by means of which a figure entered in the slide will be input in the memory, it will be necessary to depress another key also. We can obtain the same result by using the two following methods:

1° - By depressing the key 263 the slider 96 connected through the crank 80 and the shaft 81 to the clutch release slider (Chap. VI, par. *c*) is moved forward. In this case the key 264 is dragged down directly by the key 263 through the pin **r**. The key 263 doesn't preset the engagement of any register; consequently it is a non-add cycle and the figure is simply input in the memory. Since the key 263 is generally used when the figure input in the memory will be used as multiplier it is nammed « multiplier key ».

2° - By depressing an adding or subtracting key of one or both registers after having depressed the key 264; in this case the figure input is also accumulated in one or in both registers.

A figure can be input in the memory not only from the slide but also from one of the registers when releasing their total. In this case, it is sufficient to lower first the key 264 and then the total key desired. If at last, after the key 264 we depress one of the correction key (Chap. XIV and XV), the depressed key, by limitating the forward travel of the plate 137, prevents the anchor 256 engaging with the pin **f** and clears therefore the key 264 set.



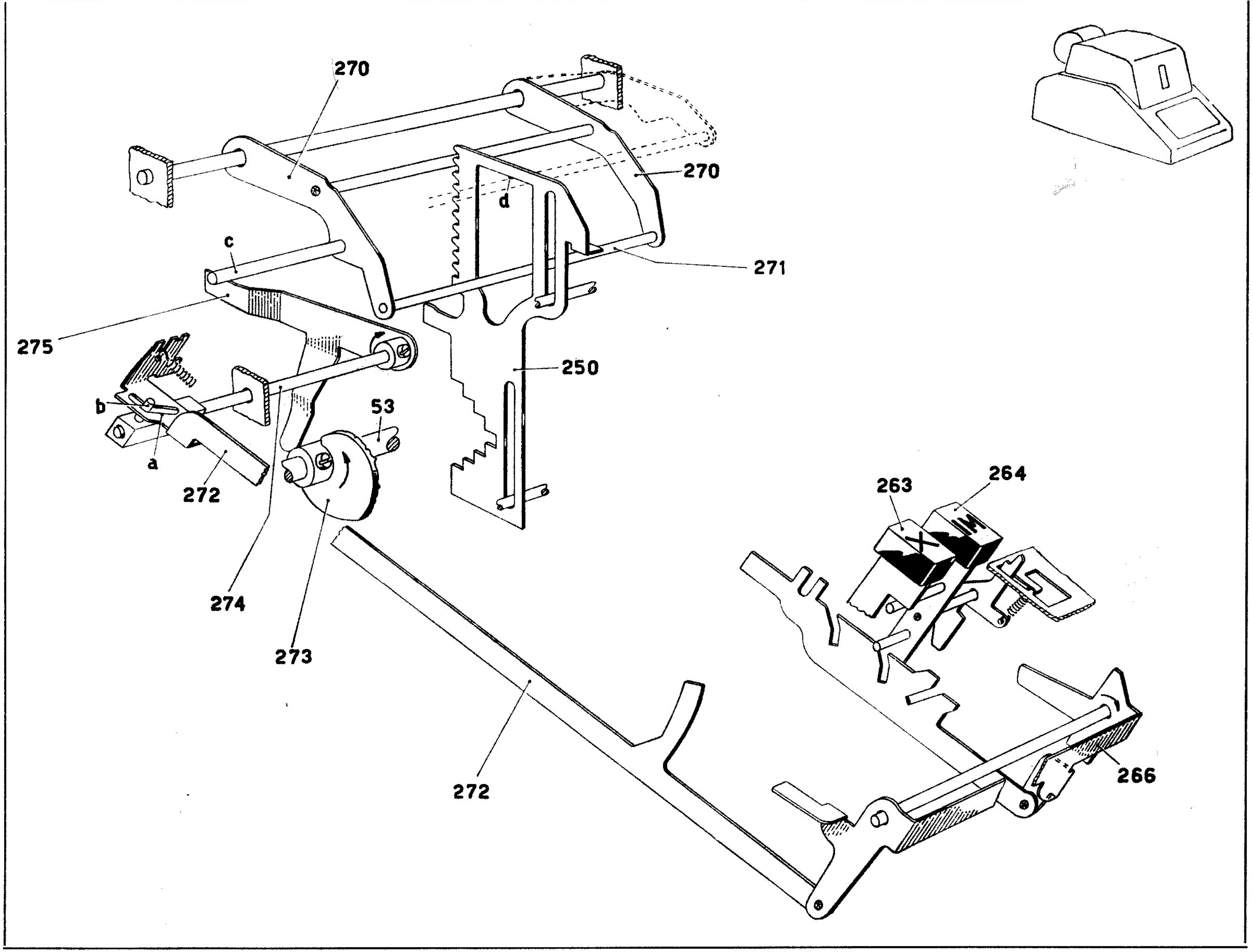
e
i
d
m
n
f
q
h
p
c
g
r
a
b

XXIII - Memory clearing.

In the first part of the memory input cycle, it is necessary to clear the precedent figure stored in the memory.

By depressing the memory input key, the bridge 266 by rotating in the direction of the arrow pushes the connecting-rod 272 backward. This latter, through its cam-slot **a** and the pin **b** pushes rightward the axle 274 on which is fixed the lever 275. This lever carries therefore its lower arm on the plane of the cam 273 of the main shaft 53. In the first part of the cycle, the cam 273 rotates the lever in the direction of the arrow which, through the pin **c**, rotates at its turn the frame made of two arms 270 and of the axle 271, moving it to the hachured position illustrated in the figure. The axle 271 thus engages the edge **d** of the racks 250 that should not be at zero bringing them back to the high zero position.

If we wish simply to clear the memory, we depress the key 263 without entering figures in the slide. The racks 250 are then moved back to zero during the first part of the cycle and they remain in this position.


d
c
b
a

XXIV - Memory reading.

The figure stored in the memory can be printed on the tape without being cleared.

By depressing the memory reading key 280 (fig. 1), the slider 267 which rests normally with its lug **d** on the pin **g** of the key moves forward rotating consequently the bridge 266 in the direction opposite to that of the arrow. The bridge 266 moves the connecting-rod 272 forward, but since the pin **b** runs now along the rear straight side of the slot **a**, the memory is not preset (Chap. XXIII). Furthermore, the wing **h** of the bridge 266 lowers the hook 284 which releases the wing **k** of the arm 285 which can therefore rotate in the direction of the arrow. The wing **k** then moves above the hook 284 holding it in low position where its step **i** is placed under the upper edge of the slot of the guide comb 283. At last, the pin **t** of the key 280 moves backward the slider 279 which, through the frame made of the two arms 282 (figure 2) and of the axle 281, moves the extra-cycle control slider 197 backward (see Chap. XVI).

If we now start the machine, we shall obtain first of all the extra-cycle preset by the slider 197 and then the cycle of the main shaft 53 (fig. 1). During the extra-cycle the plate 196 moves backward and rotates the arm 198 as well as the arm 210 in the direction of the arrow. This arm, rotates by means of the spring 278, the bridge 276 which releases the extension **n** of the connecting-rod 286 from the wing **m**. The spring 277 now moves backward the hook 284 which carries its step behind the wing **k** of the arm 285 while the connecting-rod 286 raises with its extension **o** the wing **q** of the bridge 258. This latter engages therefore the anchor 256 with the pin **f** of the arm 257 before the cycle of the shaft 53 begins. Furthermore, since the arm 285 is rotated in the direction of the arrow, the arm 287 (figure 2) integral with it locks with its bent **t** the backward travel of the two sliders 74 and 92. This travel is usaully locked by the levers 216 and 217 (see Chap. XVII, fig. 1) but, if we have depressed simultaneously the key 280 and a total key, the bent **t** prevents that during the extra-cycle, the sliders 74 and 92 might move backward and preset the engagement in total of the registers (Chap. XVII). We prevent therefore the executers being controlled at the same time by the memory racks and by the registers. This locking is necessary in the quotient printing cycle (Chap. LIII).

At the beginning of the cycle, the lobe **c** of the cam 268 oscillates the lever 269 and, through the anchor 256 and the arm 257, engages the memory racks with the executers (Chap. XXII). The upward travel of the executers is now stopped when the memory racks reach the high zero position and the figure stored in the memory is consequently transferred temporarily to the executers. At 134° of the cycle, the figure is printed on the paper; after that the executers start moving down and when they return to rest position, they bring the memory racks back to the position they had at the beginning of the cycle. The memory racks are disengaged from the executers only at the end of the cycle when the pin **p** of the cam 268 brings positively back to rest the lever 269 (Chap. XXII).

At the end of the memory reading cycle, the plate 196 is brought back to rest and the wing **m** of the bridge 276 moves the connecting-rod 286 and the hook 284 forward. The hook 284 meets now with its step the wing **k** and brings back to rest the arm 285.

Since the memory reading key 280 is only a presetting key, it is necessary to start the reading cycle to depress another key. We can therefore depress the non-add key (Chap. VI, par. *c*) which is placed on the keyboard near the key 280, or an add or subtraction key of one or both registers. In this case the figure contained in the memory is accumulated in the registers.

Since by depressing the key 280 the extra-cycle slider 197 is pushed backward (fig. 2), it locks with its wings **v** all the total keys which cannot therefore be used to start the cycle.

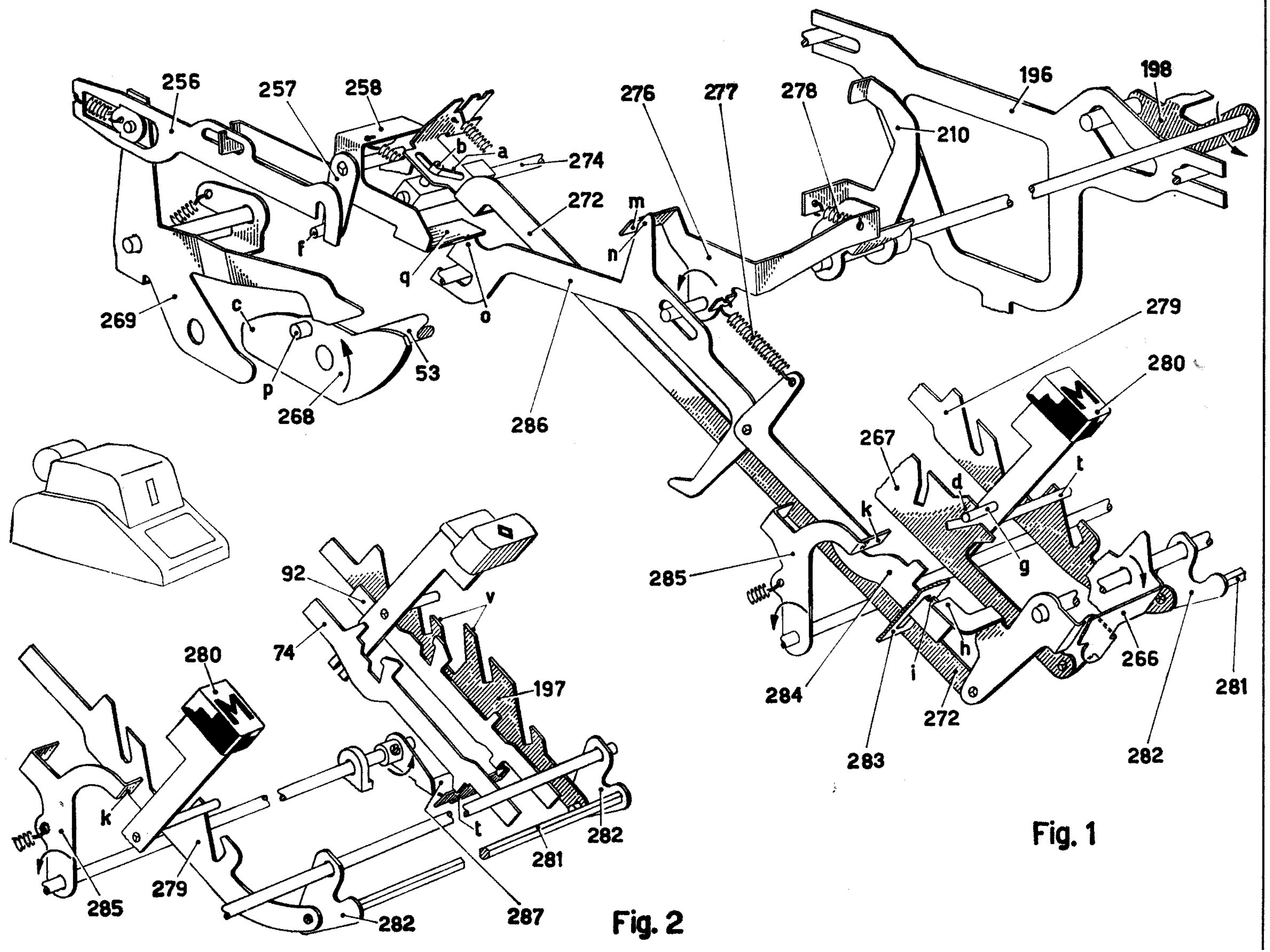

a
b
m
n
f
q
o
c
p
t
d
g
k
i
h
v
k
t

Fig. 1

Fig. 2

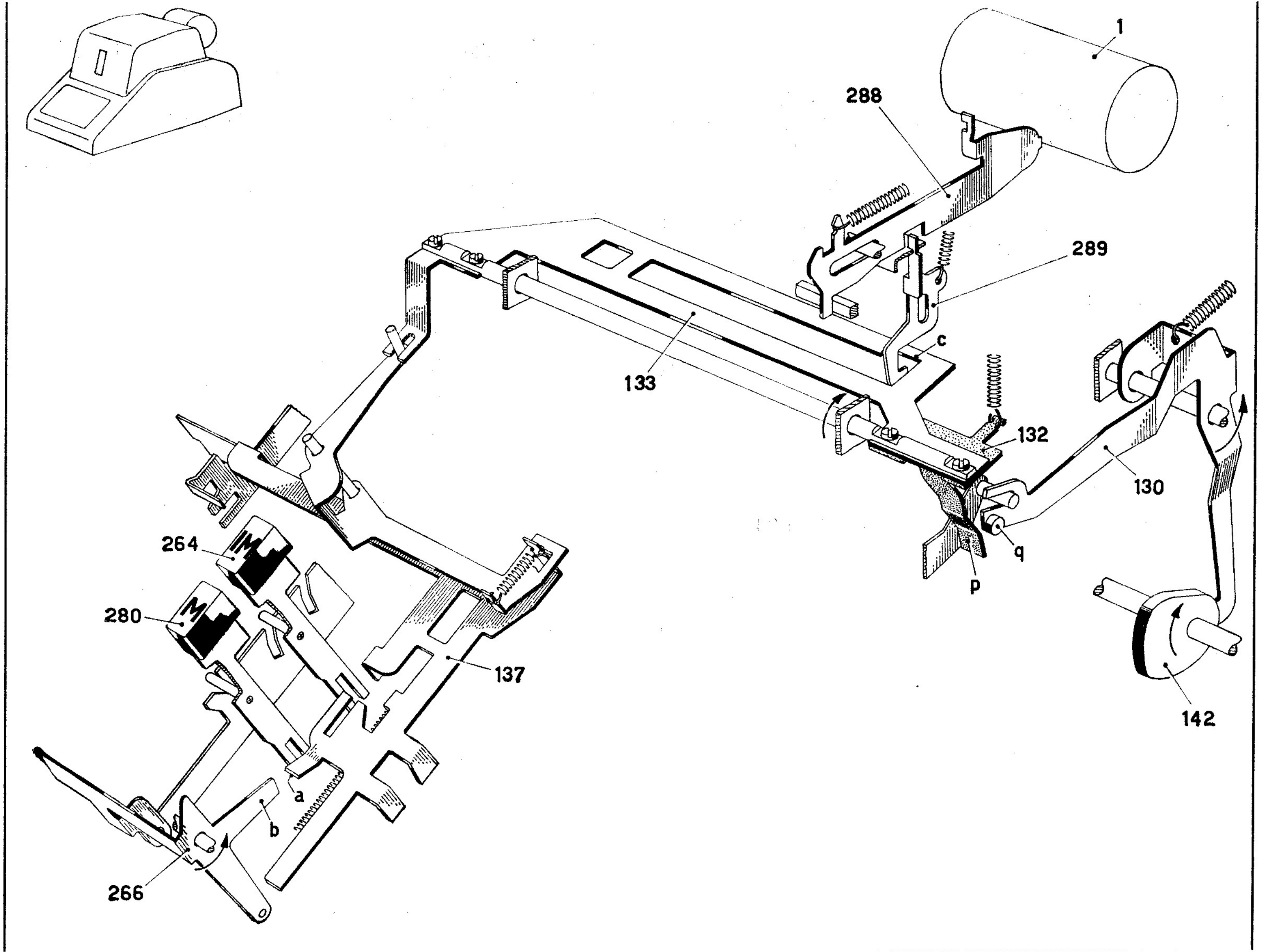
XXV - Printing the memory sign.

In the cycles in which the memory racks engage with the executers, the machine prints the sign « **x** » near the special signs illustrated in the Chap. XVIII.

Normally, in the printing cycle, the plate 137 stops, by moving forward, against the arm **b** of the bridge 266 (Chap. XXII). The plate 133 is then displaced to the right to bring the wing **p** of the small plate 132 on the trajectory of the roller **q** of the lever 130, but its opening **c** cannot move to the right of the hook 289. This latter is consequently not dragged downward and doesn't unhook the printing slider 288 of the sign « **x** ».

When we depress the memory input key 264, the bridge 266 rotates in the direction of the arrow (Chap. XXII) carrying its arm **b** above the trajectory of the wing **a** of the plate 137. This plate can now move forward for a greater travel than in the other printing cycles, thus moving rightward the plate 133 in such a way that only the wing **p** moves on the trajectory of the roller **q** of the lever 130, but also its opening **c** moves to the right of the hook 289. This latter is therefore hooked to the plate 133; consequently, when the cam 142 rotates, through the lever 130, the plate 133 in the direction of the arrow, it is dragged downward thus releasing the slider 288. This latter will strike the platen 1 in the same way as the other printing sliders (Chap. IX), printing consequently the sign « **x** » near the special signs of both registers.

The same thing happens when we depress the memory reading key 280 (Chap. XXIV); the bridge 266 rotates in the direction opposite to that of the arrow, carrying its arm **b** under the trajectory of the wing **a**. The sign « **x** » is then printed as in the case of memory input described above. Since, as we have seen in the Chap. XXIV, the key 280 controls a presetting extra-cycle, the printing is made in red instead of in black (see Chap. XIX).


c
q
p
a
b
M
M

XXVI - Short-cut multiplication method.

The product of two factors can be obtained by adding repeatedly a factor (multiplicand) as many times as the value of the other factor (multiplier). For instance:

$$12 \times 3 = 12+12+12 = 36$$

If the multiplier has two or more digits, for instance:

$$12 \times 32 = 12 \times 2 + 12 \times 30 = 384$$

we can write it:

$$12 \times 32 = (12+12) + (120+120+120) = 384.$$

Consequently, for the second digit of the multiplier, that is that of the tens, it is sufficient to move rightward the multiplicand, that is adding to it a zero by multiplying it by 10 and by adding this multiplicand as many times as the value of the second digit of the multiplier.

Examine now the following example:

$$3 \times 8 = 3+3+3+3+3+3+3+3 = 24$$

it can be written.

$$3 \times (10-2) = 3 \times 10 - 3 \times 2 = 30-6 = 24.$$

A machine performing the multiplication with this method will require three cycles instead of eight. This method is therefore called *short-cut* and consists in subtracting, for a multiplier greater than 5, the multiplicand a number of times equal to the complement to 10 of the multiplier and to add once the multiplicand multiplied by 10.

The MC 24 performs the multiplication according to this method for digits of the multiplier greater than 4; consequently, for digits from 0 to 9 of the multiplier it needs the number of cycles listed hereunder:

Multiplier	Operations
0	1 non-add cycle
1	1 adding cycle
2	2 adding cycles
3	3 adding cycles
4	4 adding cycles
5	5 subtracting cycles and 1 adding cycle
6	4 subtracting cycles and 1 adding cycle
7	3 subtracting cycles and 1 adding cycle
8	2 subtracting cycles and 1 adding cycle
9	1 subtracting cycle and 1 adding cycle

For digits from 0 to 4, after the adding cycle the slide is moved one step leftward to multiply the multiplicand by 10. For digits from 5 to 9 the slide moves after the subtracting cycles and before the adding cycle.

Consider now the following example where the multiplier has many digits:

$$3 \times 87$$

the machine should perform the operation according to this schema:

$$3 \times (10-3) + 30 \times (10-2) =$$

$$= 3 \times 10 - 3 - 3 - 3 + 30 \times 10 - 30 - 30 = 261$$

Since $3 \times 10 = 30$, it is obvious that the adding cycle concerning the digit 7 and one of the subtracting cycles concerning the digit 8 can be suppressed thus obtaining a further short-cut; the operation can therefore read as follows:

$$-3 \times 3 + 30\,(10-1) = -3-3-3+300-30 = 261.$$

The MC 24 performs this short-cut also; consequently it will make 5 cycles only instead of the 7 required by the two digits of the multiplier.

Generally for a digit of the multiplier requiring subtracting cycles, the adding cycle is suppressed while the successive digit of the multiplier is increased by one unit. Consequently, if this successive digit is equal to zero, the machine will perform an adding cycle; if it is a digit from one to four it will perform one adding cycle more; if it is a digit from five to eight it will perform one subtracting cycle less; if it is equal to nine it will perform a non-add cycle.

We shall now illustrate here an example of the operations made by the machine for a multiplier equal to 298704:

— four adding cycles and the slide displaced one step leftward;

— one non-add cycle and the slide displaced;

— three subtracting cycles and the slide displaced;

— one subtracting cycle and the slide displaced;

— one non-add cycle and the slide displaced;

— three adding cycles and the machine preset for stopping.

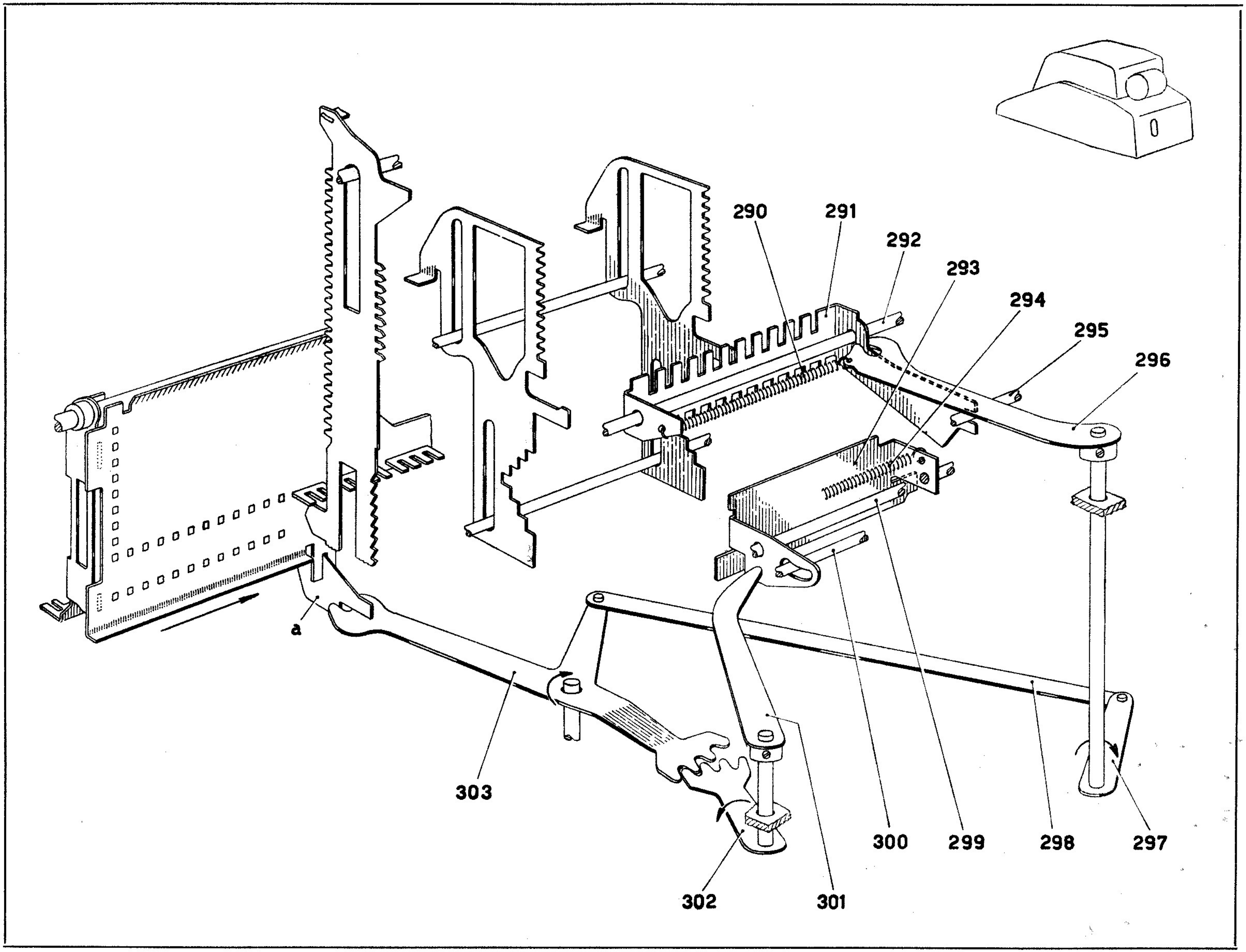
The MC 24 can also perform the *negative multiplication* in which the product is subtracted from the figure stored in the register. The negative multiplication is performed according to the short-cut method, just as the positive multiplication but with subtracting cycles instead of adding cycles and adding cycles instead of subtracting cycles.

XXVII - Entry of multiplication factors.

Usually the multiplier is entered in the slide and input in the memory. But the multiplier could already be in the memory as the result of precedent operations. The multiplicand on the contrary is merely entered in the slide after the multiplier has been input in the memory.

As we know, the slide, moves leftward (rightward in the figure) after the entry of a digit by a many steps as are the digits entered. The slide, through its wing **a** and the lever 303, rotates therefore in the direction of the arrow the sector 302 and the arm 301 integral with it. The bridge 293 which runs along the axles 299 and 300 actuated by the spring 294, follows the arm 301 by moving in the direction opposite to that of the arrow by an equal number of steps. This movement checks the entry of the multiplication factors (see Chap. XXVIII, par. *b*).

Through the lever 303 and the connecting-rod 298 the advance of the slide also rotates in the direction of the arrow the arm 297 together with the fork 296 integral with it. The comb-bridge 291 which runs on the axles 292 and 295 is moved from the fork 296 and travels in the same direction of the slide by an equal number of steps, while the spring 290 restores the play in the fork leftward (see the figure). The comb 291 is used during the multiplication to check the movement of the multiplication slide (Chap. XXXII) and during the division to check the movement of the division slide (Chap. XLIII).



a

XXVIII - Multiplication control.

a) *Depressing the key.*

Usually the lever 308 actuated by the strong spring 311 through the lever 313 and the connecting-rod 310, rests against the pin **c** of the multiplication key 306. The pin **c** in also held by the connecting-rod 309.

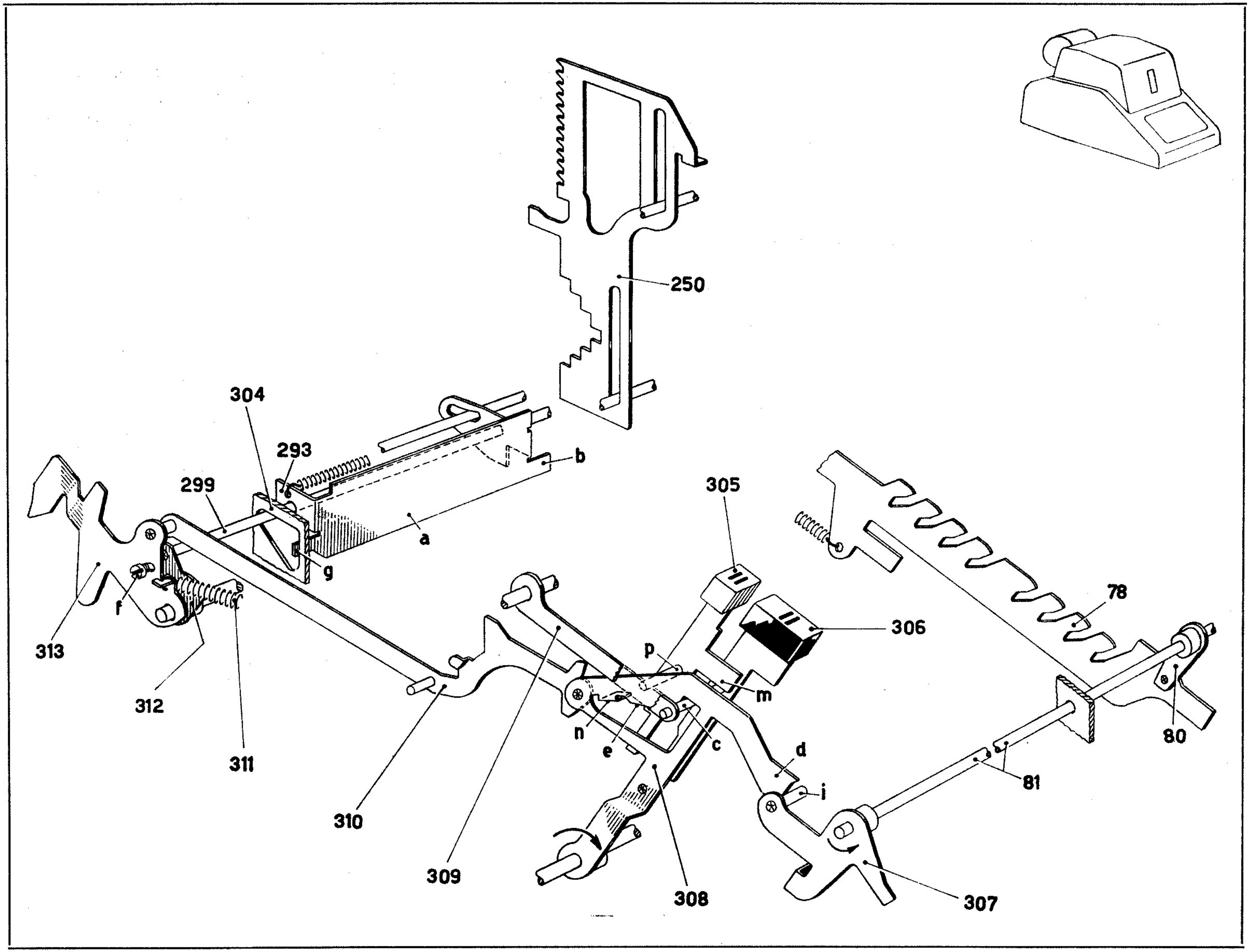
If the factors of the multiplication have been entered correctly, by depressing the multiplication key 306 the pin **c** releases the lever 308 which then rotates in the direction of the arrow. The arm **d** of the lever 308 rotates now the crank 307 which, through the axle 81 and the crank 80 moves forward the clutch release slider 78 thus starting the multiplication. The edge **e** of the lever 308 holds the key down until the multiplication ends.

The multiplication can be also controlled by the negative multiplication key 305 which, through the extension **m**, drags down the key 306. The lever 308, by rotating in the direction of the arrow, places the wing **n** above the pin **p** and holds the two keys down until the operation ends. Please note that if the key 306 is depressed alone, the wing **n** of the lever 308 moves on the trajectory of the pin **p** of the key 305 thus preventing it being accidentally depressed.

b) *Locking for lack of multiplicand.*

The multiplication control is prevented if no multiplicand figure has been entered. We have seen at Chap. XXVII that the bridge 293 moves rightward by as many steps as are the figures entered in the slide. The axle 299 on which runs the bridge 293 is secured on the small plate 312 integral with the lever 313 through the adjustable screw **f**; consequently when depressing the key 306, the spring 311 moves forward the bridge 293 also. If no multiplicand has been entered, the bridge 293 is in the position illustrated in the figure and its wing **g** stops against the edge of the small left external side-plate 304, preventing therefore the lever 308 to rotate and start the multiplication.

To release the depressed key we can depress one of the correction keys (Chap. XIV and Chap. XV). During this cycle the lever 308 as well as the slider 310 are brought back to rest as described in the Chap. XXVIII.


250
304
293
b
299
305
a
g
f
313
312
311
p
306
78
m
n
e
c
d
i
80
81
310
309
308
307

c) *Locking by excess of factors.*

We have seen at Chap. XXVII that during the entry of the multiplicand the bridge 293 moves in the direction opposite to that of the slide by an equal number of steps. In this movement to the left from the rest position (fig. 1) the beam **a** of the bridge 293 moves behind a number of memory racks 250 equal to the number of digits of the multiplicand less one.

If the racks 250 behind which arrives the beam **a** are at zero, their lower edge is immediately above the upper edge of the beam (fig. 2). We see therefore that, if we now move the bridge 293 forward (par. *a*) the beam **a** can pass under the racks. The wing **b** projecting at the left of the beam **a** (fig. 3) is lower than the upper edge of the beam by four steps about of the racks 250. The wing **b** will be able therefore to move forward only if the rack 250 behind which it is placed is not in a position from 5 to 9.

The multiplication control should be prevented when the product of the factors entered exceeds the capacity of the machine which is of 13 digits. This is why we use the well known law according which the number of digits of a product is at the most equal to the sum of the digits of the multiplicand and of the multiplier.

If the sum of the digits of the multiplicand entered in the slide and of the multiplier entered in the racks 250 is greater than 13, the bridge 293, during the entry of the multiplicand has moved by such a number of steps that its beam **a** is now placed behind one rack 250 at least in which a digit of the multiplier has been precedently entered (fig. 2). By depressing the multiplication key, the beam **a** stops therefore against this rack 250 thus preventing the multiplication control (par. *a*) of two factors which product exceeds the capacity of the machine. The void step made by the beam **a** while moving leftward (fig. 1) before moving behing a rack 250 is preset to check capacity of the machine which is one digit more than the number of memory racks.

Furthermore, since the machine operates according to the short-cut multiplication method (Chap. XXVI), if the first left digit of the multiplier is higher than 4, the slide should advance one more step after reaching the rack 250 of the higher digit (Chap. XXXVII). In this case it is necessary preventing the multiplication control when the sum of the multiplicand and of the multiplier digits is equal to the number of the executers. This is why the wing **b** projecting from the beam **a** explores a rack 250 more, with respect to the beam **a**, but stops against this rack only if this is in one of the positions from 5 to 9 (fig. 3) thus preventing only then the multiplication control.

In the cases in which by depressing the key 306 the multiplication is not started, by depressing one of the correction keys (Chap. XIV and XV) we clear or modify the slide entry. The lever 308 together with the slider 310 is moved back to rest position during this correction cycle, as described in Chap. XXXVIII.

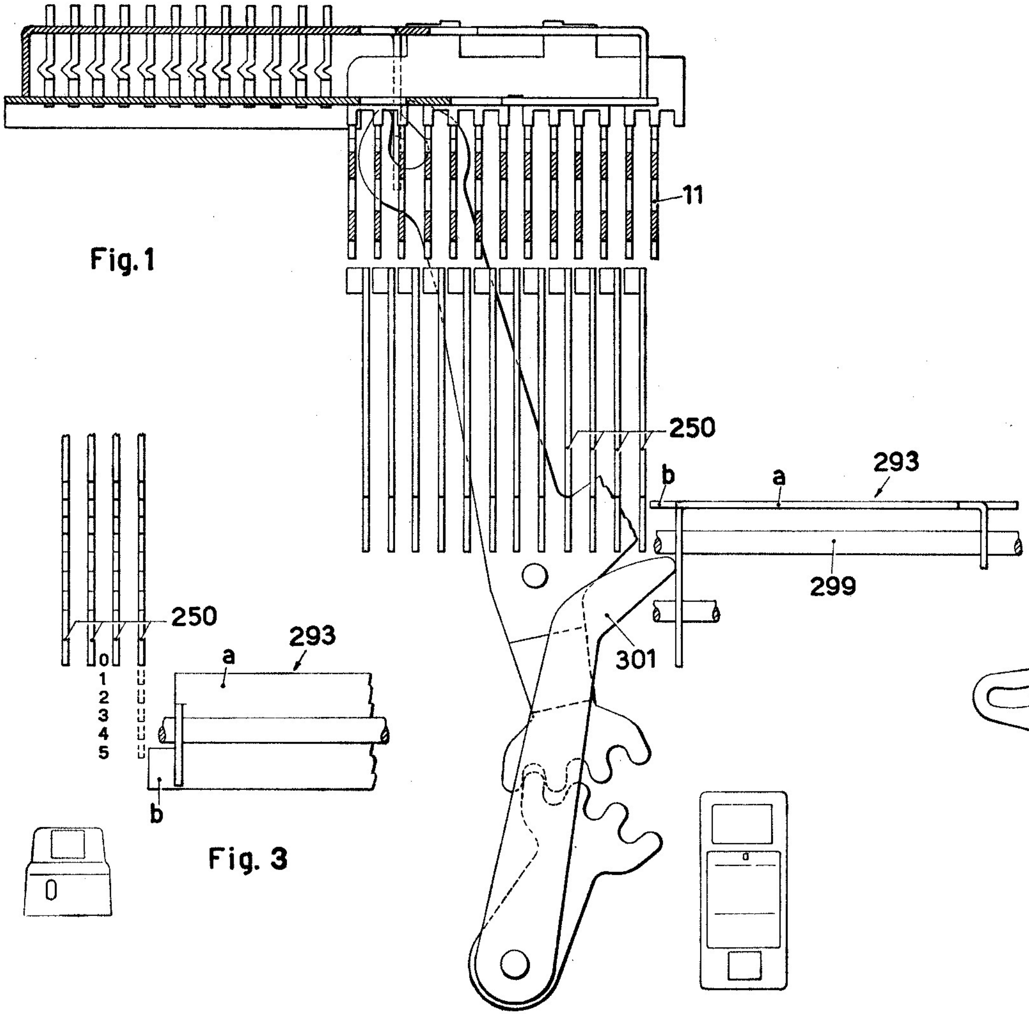

11
250
b
a
293
299
301
250
293
a
0
1
2
3
4
5
b
0

Fig. 1

Fig. 3

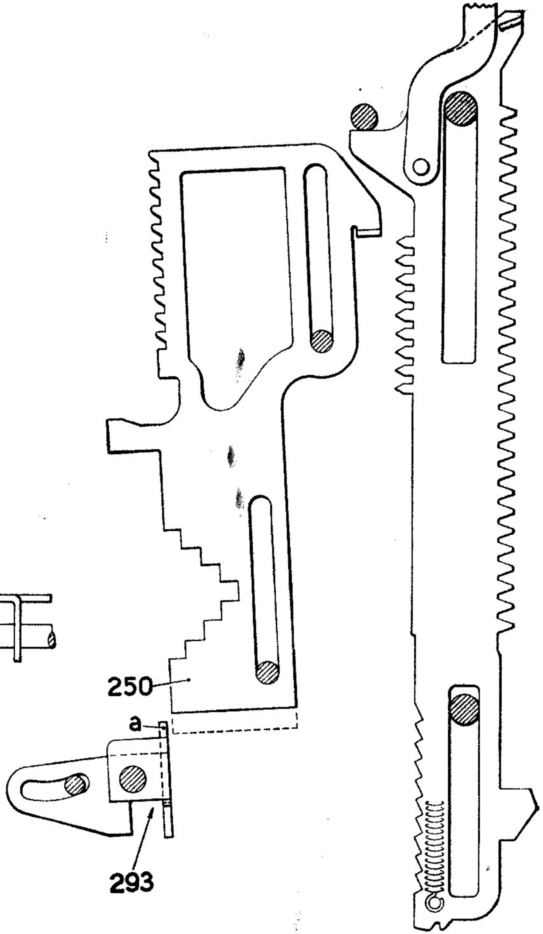


Fig. 2

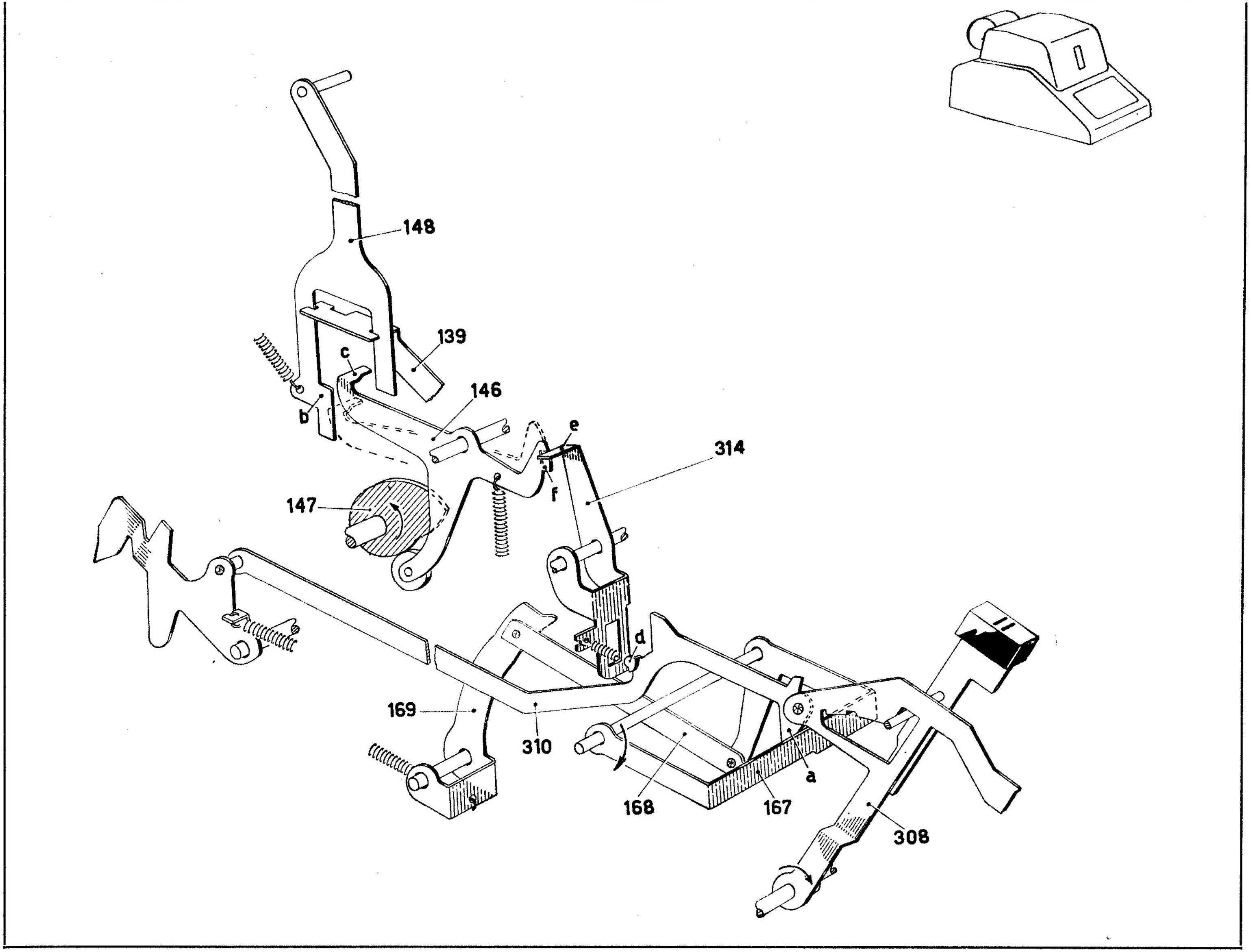
XXIX - Slide restoring control.

When the lever 308 rotates in the direction of the arrow after one of the multiplication keys has been depressed, the extension **a** of the connecting-rod 310 rotates the bridge 167 in the direction opposite to that of the arrow. The bridge 167 rotates, through the connecting-rod 168, the rod 169 (Chap XIII) in such a way to exclude the slide restoring during all the multiplication cycles. The slide restoring will take place in the last cycle in which, as we shall see in Chap. XXXVIII, the connecting-rod 310 is moved back to the rest position illustrated in the figure.

XXX - Printing the multiplicand.

The hook 314 rests normally against the extension **d** of the connecting-rod 310. When at the beginning of the multiplication the connecting-rod 310 moves forward, the hook 314 goes resting with its wing **e** against the lug **f** of the lever 146. In the first multiplication cycle, the printing is performed regularly and the machine prints the multiplicand horizontally on the tape. Furthermore, the cam 147 oscillates the lever 146 which, through the fork 148, performs the line-spacing (see Chap. X).

Following the oscillation of the lever 146 the wing **e** of the hook 314 trips under the lug **f** engaging the lever 146 in rotated position (hachured in the figure). In successive cycles the wing **c** of the lever 146 will be in front of the heel **b** of the fork 148 and will prevent this latter moving forward to preset the line-spacing. The slider 139 controlling the printing (see Chap. IX), being connected to the fork 148 will not be able to move forward and the printing will be excluded during all the multiplication cycles after the first.


c
b
e
f
d
a

XXXI - Printing the multiplication sign.

In the first multiplication cycle the machine prints near the multiplicand a sign which shows if the product is accumulated in the register in addition or in subtraction, that is if the multiplication is positive or negative.

When the positive multiplication key 306 is depressed, the connecting-rod 310, by moving forward, releases from its pin **b** the wing **a** of the lever 318. This latter rotates in the direction of the arrow stopping with its wing **c** against the heel **d** of the lever 316. Furthermore, the lever 318, through the transmission lever 317, moves the connecting-rod 315 forward.

The wing **e** of the connecting-rod 315 moves then on the trajectory of the steps **f** of the sliders 222 and 224 which are therefore stopped at rest. The wheel 219 (see also fig. 2) connected to the slider 222 of the second register special signs prints then the sign « = », of positive multiplication. As we have already seen at Chap. XVIII, the printing takes place all the same notwithstanding the slider 222 not being raised because the hook 220 is always engaged with the printing control plate 133. On the contrary, the wheel 218 connected to the slider 224 of the first register special signs prints no sign since the hook 226 engages the plate 133 only when the slider 224 leaves the rest position.

When the negative multiplication key 305 is depressed, not only it lowers the key 306, but it rotates also the lever 316 thus carrying the heel **d** off the trajectory of the wing **c**. The lever 318 makes now a greater rotation than in the precedent case and moves the connecting-rod 315 to the left until the wing **e** moves on the trajectory of the only step **f** of the slider 224 and the wing **g** on the trajectory of the step **f** of the slider 222. The slider 224 is therefore stopped at rest and the wheel 218 doesn't print any sign as in the precedent case, while the slider 222 moves one step upward and the wheel 219 prints the sign «$\underline{x}$» of the negative multiplication (see fig. 2).

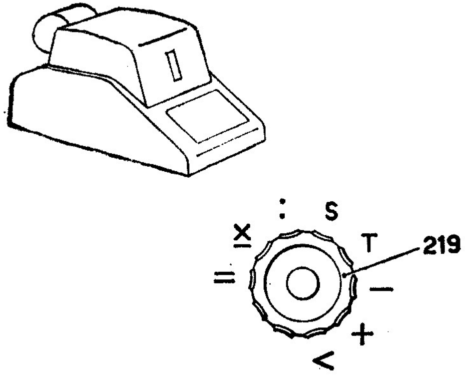

:
S
×
T
219
=
–
+
<

Fig. 2

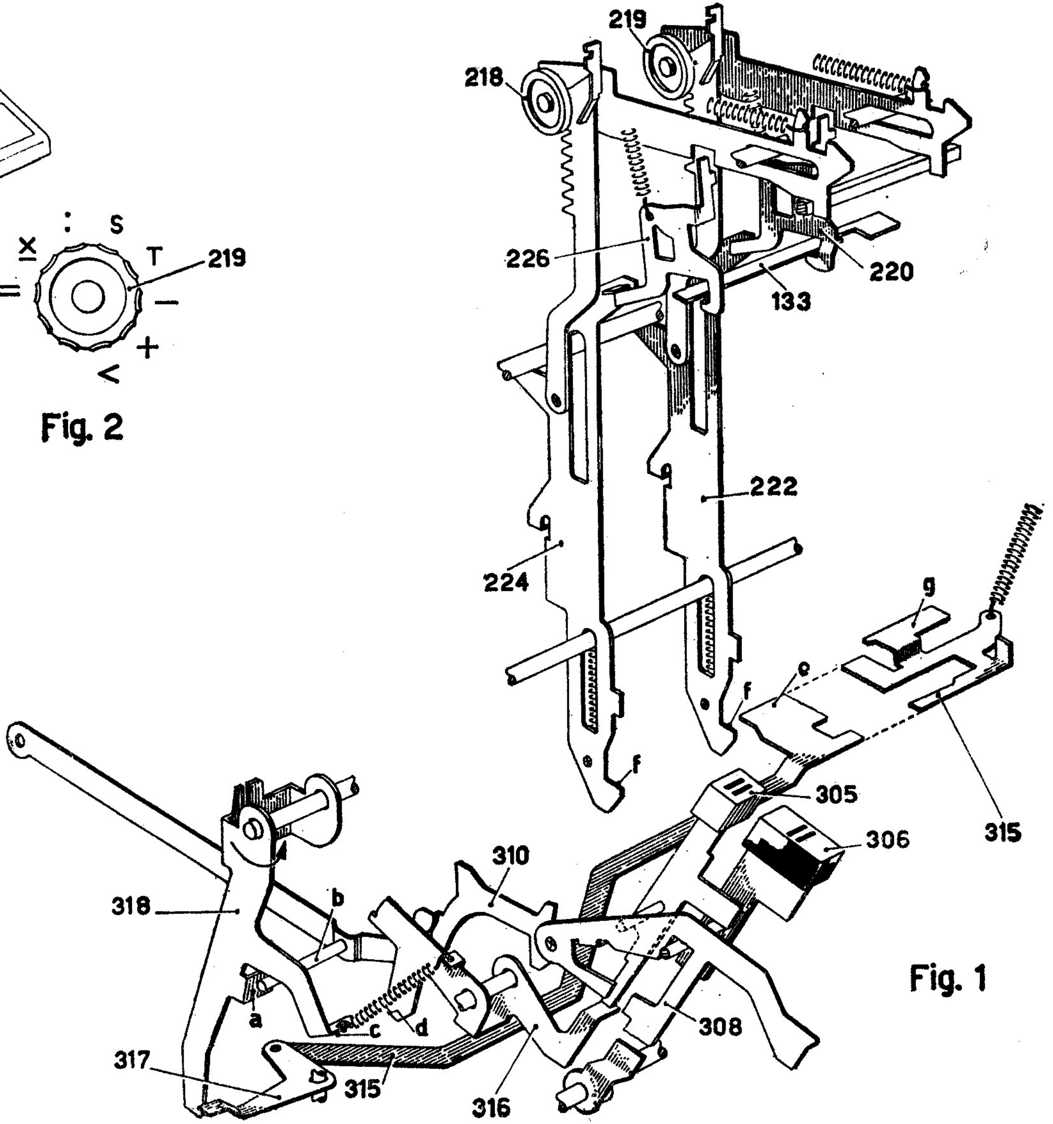
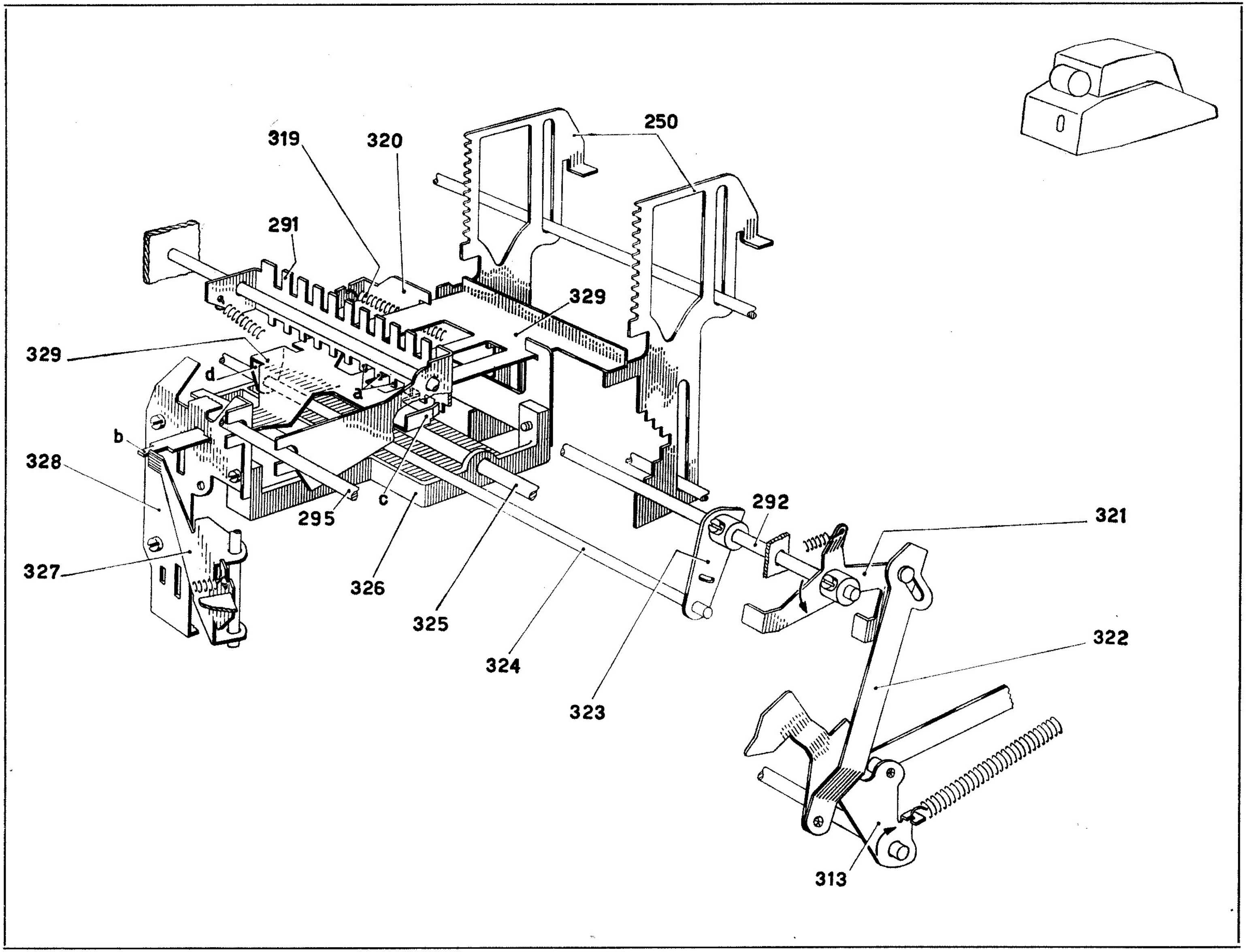

g
e
f
f
b
a
c
d

Fig. 1

XXXII - Hooking the multiplication slide.

As we shall see latter on during the multiplication, the racks 250 in which has been entered the multiplier are explored one by one by a set of testers to check the various operations of the machine. These testers are carried by the small multiplication slide which includes the support 326 and the two plates 320 and 328 fixed on it and it runs on two transversal axles 325 and 295.

When the lever 313 rotates in the direction of the arrow after the depressing of one of the multiplication keys (Chap. XXVIII), the rod 322 is pushed upward and allows the lever 321 to rotate in the direction of the arrow. The arm 323 which, through the axle 292 is integral with the lever 321, moves forward the universal bar 324 together with the plate 329 which runs in the plates 320 and 328 of the small slide and also on the same universal bar 324 through is hollow wing **d**. The extension **b** of the plate 329 gets then released from the hook 327, while the wing **q** engages between the lower teeth **a** of the bridge 291 which, as we have seen in Chap. XXVII, has moved leftward (rightward in the figure) together with the entry slide. From now on, the small slide follows the movements of the bridge 291 thanks to the spring 319 and carries its testers to explore one by one the memory racks 250 starting from that of the units.


d
a
b
c

XXXIII - Operating sense control.

a) *Foreword.*

This control is done by the operating sense tester which includes the slider 333 running in the small multiplication slide and the small plate 334 running vertically by means of its wings **n** on the slider 333, as we shall better see in Chap. XXXVII. The slider 333 is supplied with a wing **p**, while the small plate 334 is supplied with a wing **q** placed on the plane of the wing **p** and with a wing **r** more behind with respect to the wing **p** and **q**. Normally, the wing **q** is almost in contact with the wing **p**, as illustrated in the figures 1 and 2.

As we have seen at Chap. XXXII, when we depress one of the multiplication keys 306 or 305, the arm 323 of the anchor 292 rotates in the direction of the arrow. On the arm 323 is secured the arm 342 which, by rotating in the direction of the arrow, carries its flexible tooth 342' pivoted on it off the trajectory of the wing **a** of the arm 330 integral with the two arms 332 through the axle 295.

The cam 340 of the main shaft 53, through the bridge 341, te bridge 338 and the connecting-rod 339, oscillates the axle 295 at every cycle in the direction of the arrow. During this oscillation the bar 331 fixed on the arm 330 and on the right arm 332 pushes forward the operating sense tester 333, 334 to explore with the wings **p**, **q** and **r** the extension **d** of the rack 250 behind which the tester is placed in this moment.

Particularly, if the rack 250 is in a position corresponding to a digit from one to four, the tester 333, 334 stops immediately with the wing **p** or with the wing **q** against the extension **d**; if the rack 250 is in a position from five to nine, the tester stops with the wing **r** against the extension **d** after a certain travel (fig. 2). In the first case the left arm 332 and therefore the bridge 338 remains still; in the second case it oscillates in the direction of the arrow. As we shall see hereafter, the bridge 338 is used to control the second register inversion presetting arm 104 (Chap. VII).

b) *Positive multiplication.*

If the key 306 has been depressed, the connecting-rod 310, by moving forward, releases from its extension **c** the bridge 337 which goes resting quite immediately on the arm **b** of the lever 316 where it remains inoperative. The small plate 335 pivoted on the bridge 338 remains with its end **e** under the wing **f** of the arm 336 integral with the arm 104.

We have seen that in the exploration of a multiplier digit from one to four, the bridge 338 doesn't oscillate. In this case it doesn't influence the arm 104 and the register remains in addition. On the contrary, the exploration of a multiplier digit from five to nine, the bridge 338 oscillates at every cycle in the direction of the arrow and, through the end **e** of the small plate 335, raises every time the wing **f** of the arm 336. This latter rotates in the direction of the

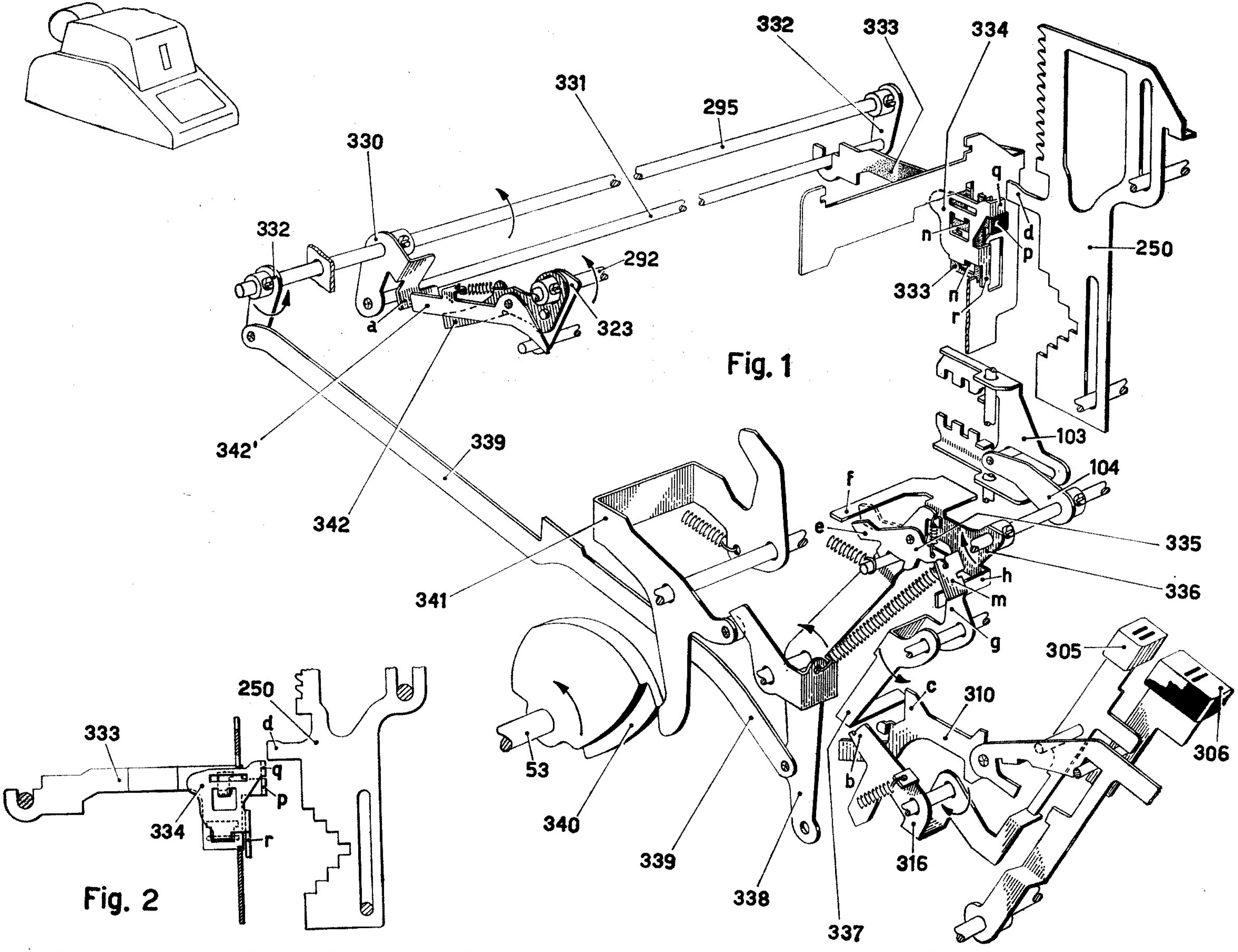

a
q
n
d
p
n
r
f
e
h
m
g
c
b

Fig. 1

250
d
333
q
p
334
r

Fig. 2

arrow and through the arm 104 raises the anchor 103 thus presetting at every cycle the inversion of the second register in subtraction; consequently the machine operates in subtraction.

c) *Negative multiplication.*

Since in the negative multiplication the product is subtracted from the figure contained in the register, the operating sense of the machine should be inverted respect to the precedent case.

By depressing the key 305 we rotate the lever 316 in the direction of the arrow; consequently the bridge 337 is released not only from the extension **c** of the connecting-rod 310, but it is also released from the arm **b** of the lever 316 and rotates in the direction of the arrow by a greater angle than in the precedent case. The arm **g** of the bridge 337 then actuates the wing **h** of the arm 336 and makes it rotating in the direction of the arrow together with the arm 104, thus presetting the inversion of the register in subtraction for all the time during wich the key 305 remains down. Furthermore, the wing **m** of the bridge 337 rotates the small plate 335 which carries its end **e** above the wing **f** of the arm 336 (hachured position).

For a multiplier digit from one to four, the bridge 338 doesn't rotate and the small plate 335 doesn't influence the arm 336 which remains in subtracting position. For a multiplier digit from five to nine, the bridge 336 rotates at every cycle in the direction of the arrow and the small plate 335 lowers every time the wing **f** of the arm 336 and therefore the anchor 103 thus clearing the precedent presetting; consequently the register returns to adding position.

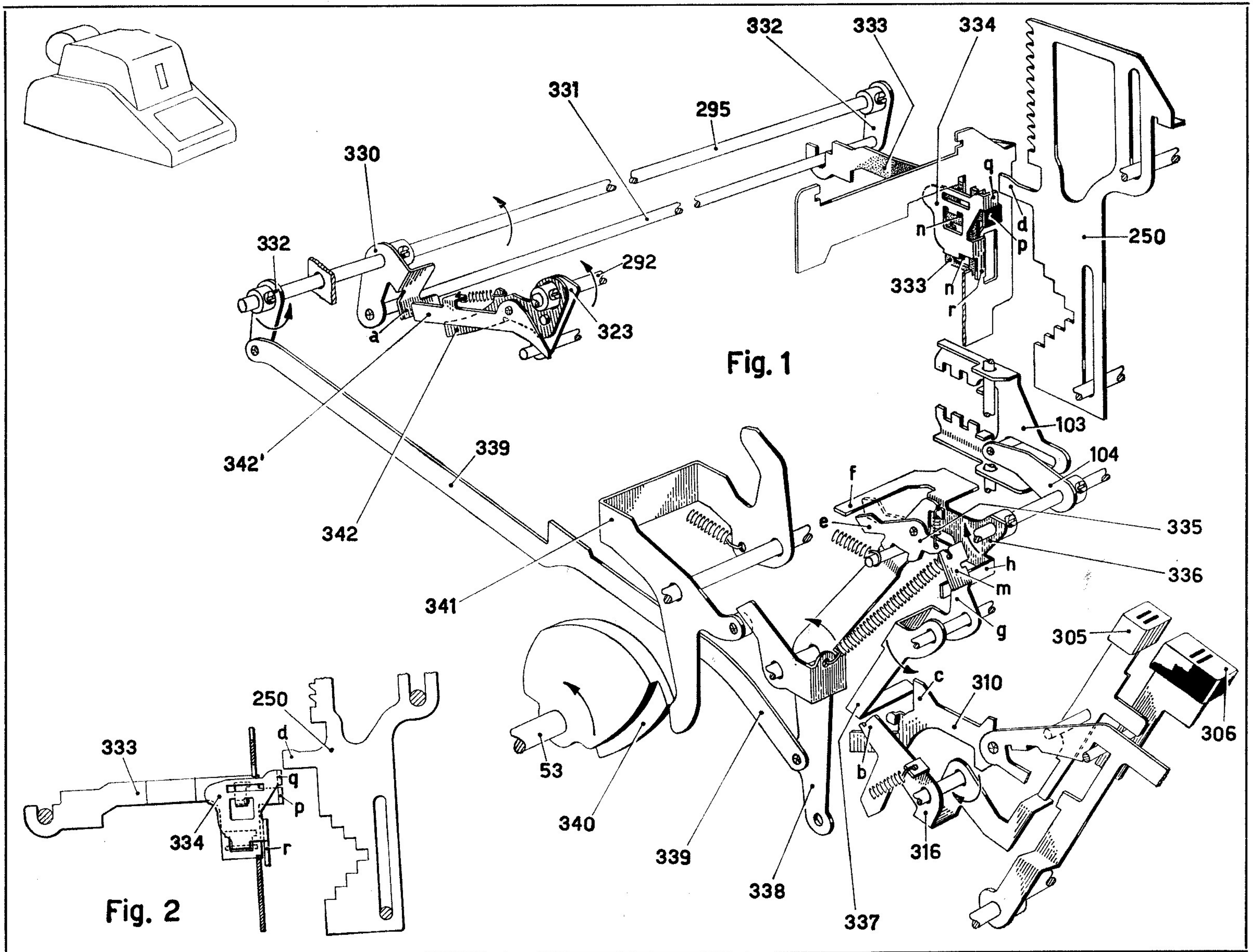

a
q
n
d
p
n
r
f
e
h
m
g
c
b
d
q
p
r

Fig. 1

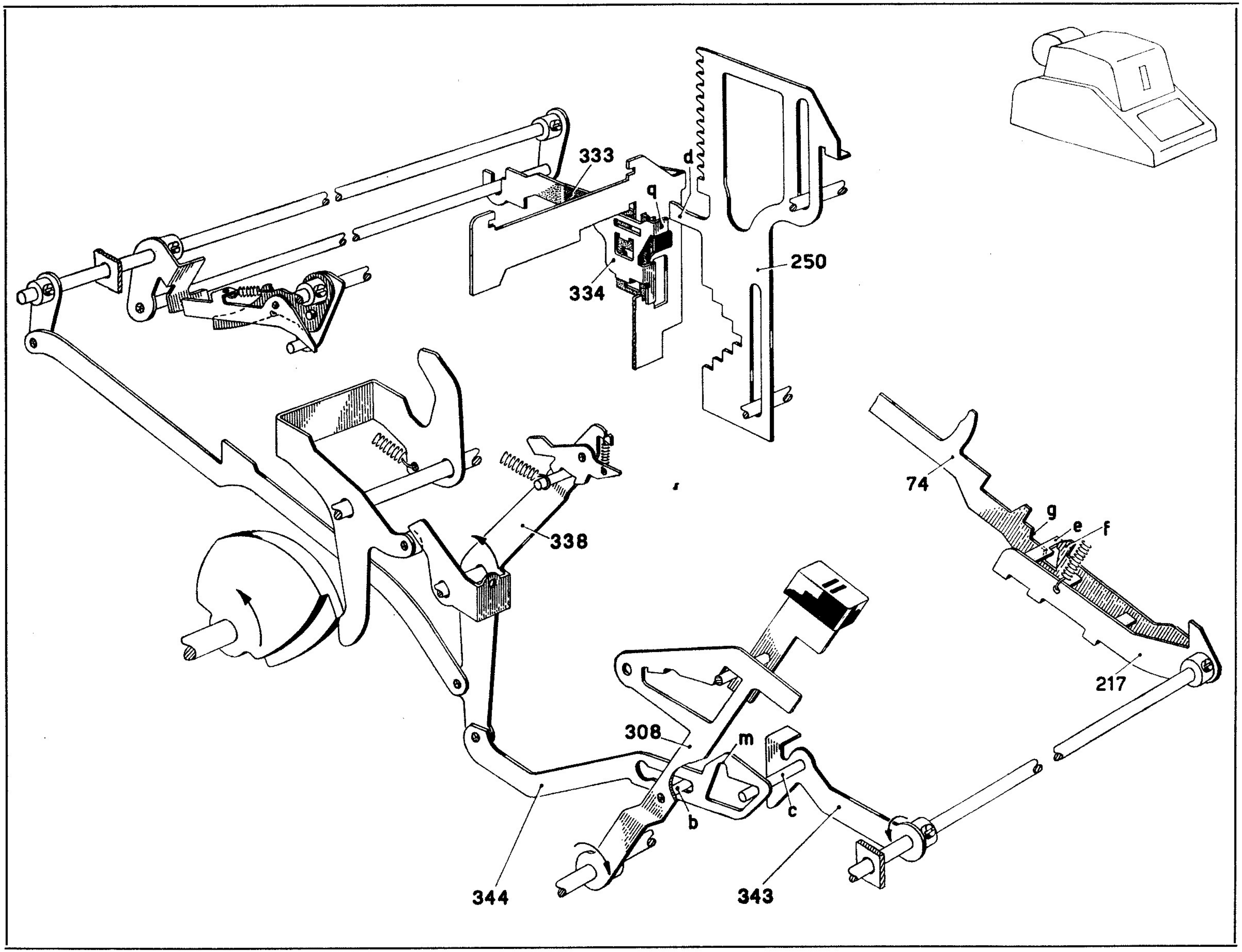
Fig. 2

XXXIV - Register engagement control.

By depressing one of the multiplication keys, the lever 308 rotates in the direction of the arrow and, through its pin **b**, lowers the connecting-rod 344. This latter, by means of its pin **c**, rotates the arm 343 together with the lever 217 to which it is integral with. The wing **e** of the lever 217 doesn't leave the extension **f** of the slider 74 but moves on the trajectory of the step **g** of it which, during the cycle, will make such a forward travel to preset the engagement of the second register (Chap. VI). The product will be accumulated in the second register.

If a memory rack 250 is at zero as illustrated in the figure, its extension **d** is above the wing **q** of the small plate 334. In its forward movement (Chap. XXXIII) the tester 333, 334 is not stopped by the extension and makes a greater travel than in the cases in which the rack 250 was in a position different than zero. The bridge 338 by oscillating the direction of the arrow moves then the opening **m** of the connecting-rod 344 in connection with the pin **c** of the arm 343. This latter will thus return to rest and the wing **e** of the lever 217 doesn't stop the slider 74 which doesn't preset therefore the engagement of the second register. The cycle corresponding to a zero of the multiplier is therefore a non-add cycle.

Please note that the oscillation of the bridge 338 which takes place in this cycle presets the inversion of the register as would do a multiplier from five to nine. This presetting remains anyhow without effect because the register is not engaged with the executers.


333
d
q
250
334
338
74
g
e
f
217
308
m
b
c
344
343

XXXV - Cycles number control.

This control is done by the cycles number tester 345 which runs on the small multiplication slide.

a) *Tester release.*

When the lever 313, rotates in the direction of the arrow after the depressing of one of the multiplication keys (Chap. XXVIII), it releases the wing **a** of the bridge 352 which rotates in the same direction and goes resting with its pin **b** against the heel **c** of the bridge 351.

In the first multiplication cycle of each memory rack 250, at 20° about of rotation of the main shaft 53, the cam 350 allows the bridge 351 to oscillate in the direction of the arrow actuated by its own spring. The bridge 351, by means of the pin **d**, drags down the bridge 353 which drags at its turn down the hook 354 carried by the small multiplication slide. The tooth **e** of the hook 354 now releases the tester 345 which trips forward. It goes resting with its wing **i** against a step of the double stair **f** of the rack 250 which is in this moment in front of it, thus making a number of steps which depends of the position of the racks (fig. 2). If the rack 250 is at zero, the tester 345 makes one step; if the rack is in a position from one to four, the tester 345 makes respectively a number of steps from one to four; if the rack is in a position from five to nine, the tester 345 makes a number of steps equal to the complement to ten of the digit entered that is a number of steps from five to one. The number of steps done establishes the number of cycles the machine should perform. In the fig. 1 the rack 250 is at zero; in the figures 2 and 3 it is position two.

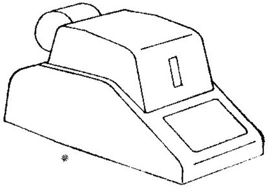
At 100° of the cycle, the cam 350 rotates in the direction opposite to that of the arrow the bridge 351 which engages with the opening **g** on the pin **b** of the bridge 352 (fig. 3). In the following cycles of this same digit, the bridge 352 will not be able to oscillate and will anymore engage the tester 345. The release of the tester 345 will be repeated in this same way in the first cycle of each rack 250 in which is stored a multiplier digit, as we shall see at par. *c*).

b) *Stroke-counter.*

The bridge 353 rests normally against the extension **h** of the bridge 352 (fig. 1). When this latter at the beginning of the multiplication rotates in the direction of the arrow it releases the bridge 353 for all the operation. At 100° abouth of the first multiplication cycle concerning each rack 250, the bridge 353 by following with the pin **d** the bridge 351, rotates in the direction of the arrow and goes meshing between the teeth of the tester 345 released precedently.

At 150° abouth of the cycle, the cam 346 oscillates in the direction of the arrow the arm 347 which, through the frame including the two arms 348 and the axle 349, moves the bridge 353 backward.

This latter moves one step back the tester 345 which will be therefore held in the position reached by the tooth **e** of the hook 354. In the following cycles the tester 345 is thus brought back step by step toward the rest position.



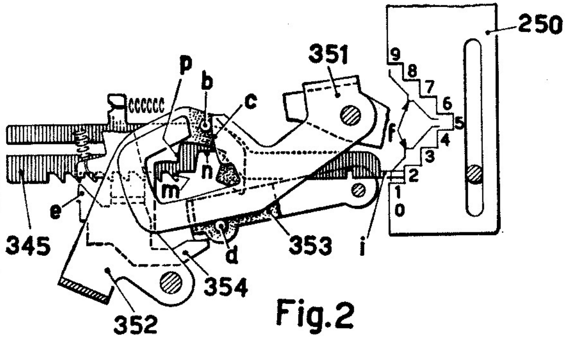

250
351
p
b
c
9
8
7
6
5
4
3
2
1
0
f
n
m
e
345
353
i
d
354
352

Fig.2

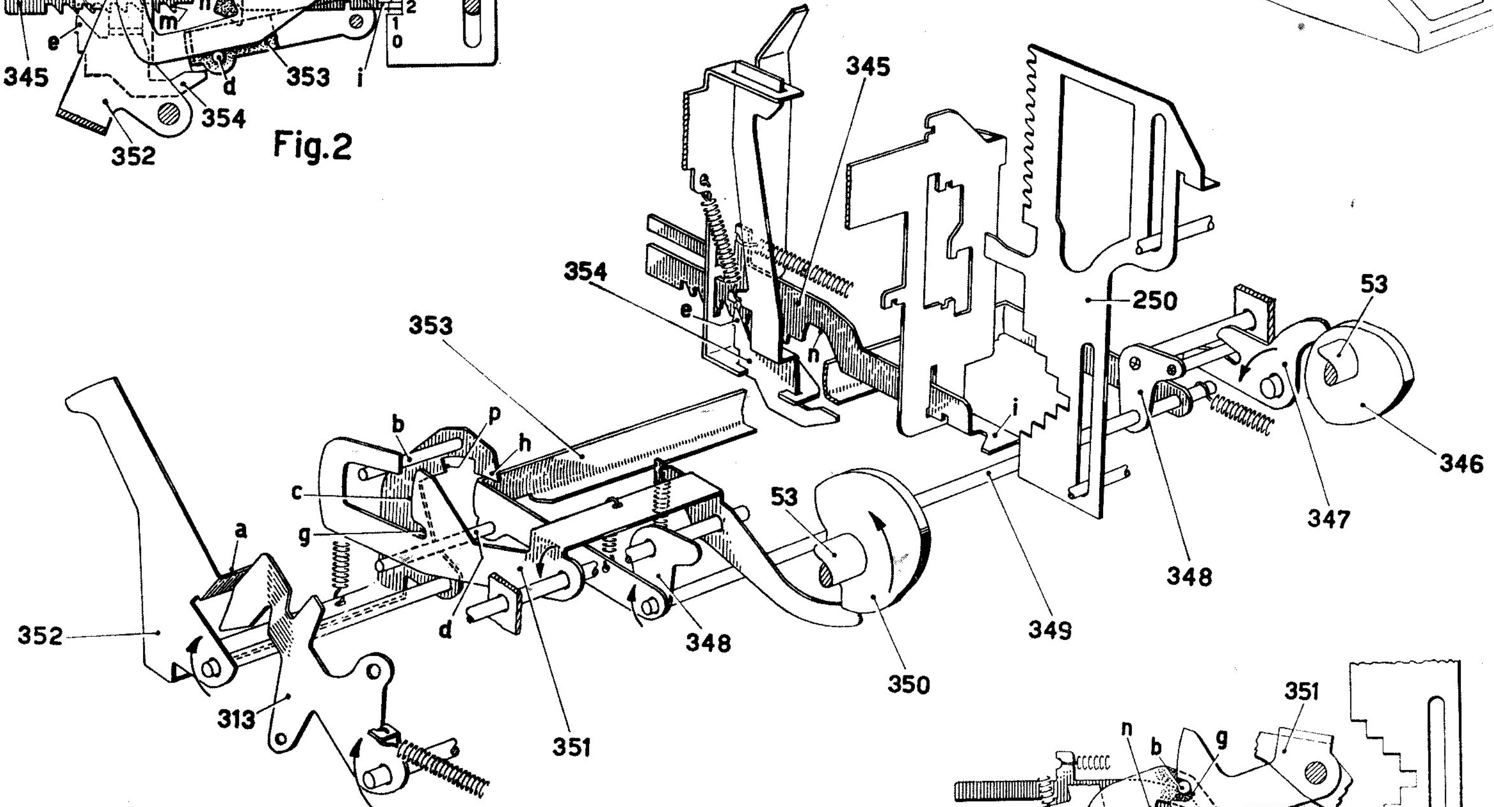

345
354
e
n
250
53
i
353
b
p
h
c
a
g
352
d
313
351
348
53
350
349
348
347
346

Fig.1

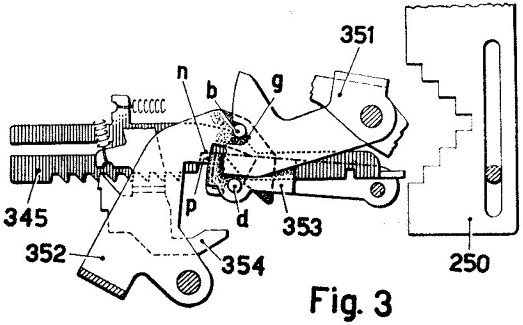

351
n
b
g
p
d
353
345
352
354
250

Fig. 3

c) *Last step of the tester.*

By returning step by step, the tester 345 has made is last but one step (fig. 3), the next cycle starts regularly; this is the last cycle concerning the rack 250 which is in front of the tester 345. At 100° of this cycle, the bridge 353 enters in the opening **n** of the tester 345. When at 150° the bridge 353 moves backward, not only it carries the tester 345 to rest position, but it acts on the step **p** of the bridge 352 moving it again temporarily to the position illustrated in the figure 1 and releasing the opening **g** of the bridge 351 from the pin **b**.

If in this last cycle the multiplication doesn't end because there are other racks 250 to explore (Chap. XXXVIII), the lever 313 doesn't return to rest. At the end of the cycle, the bridge 352 goes therefore resting again with the pin **b** against the heel **c** of the bridge 351. This latter at the beginning of the next cycle, which will be a cycle concerning the next rack 250, releases the tester 345, through the bridge 353, as see above.

It is obvious that, if the tester 345 has advanced one step only after having explored a rack 250 at zero, one or nine, the bridge 353 enters in the opening **n** at 100° of the same cycle; consequently in this cycle are performed the functions of the first cycle and also those of the last one concerning a rack 250.

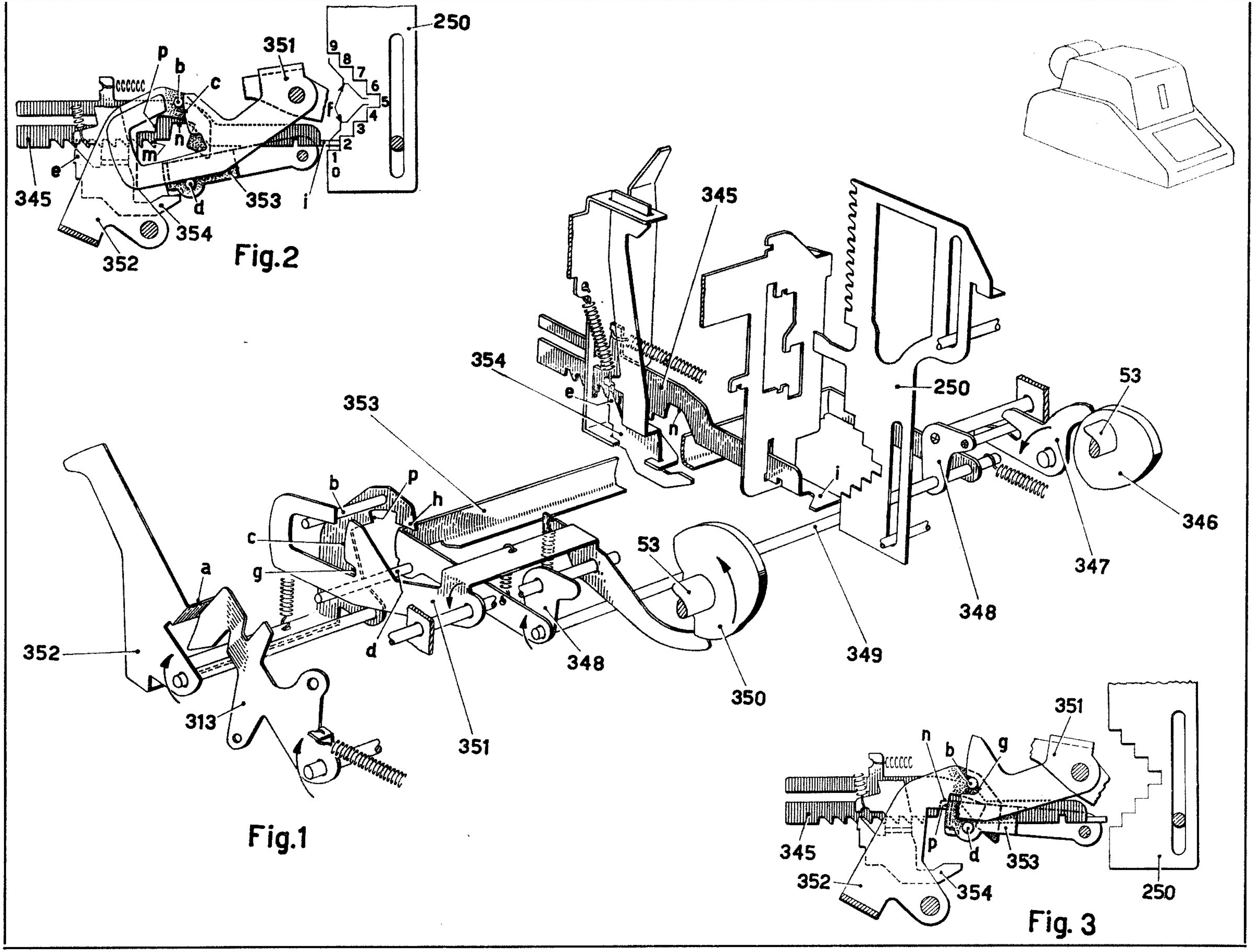

250
351
p
b
c
9
8
7
6
5
4
3
2
1
0
f
m
n
e
345
353
i
d
354
352
345
354
e
n
250
53
346
347
348
353
b
p
h
c
a
g
d
351
53
348
349
350
352
313
351
n
b
g
345
p
d
353
352
354
250

Fig.2

Fig.1

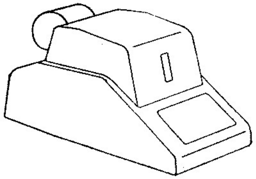
Fig. 3

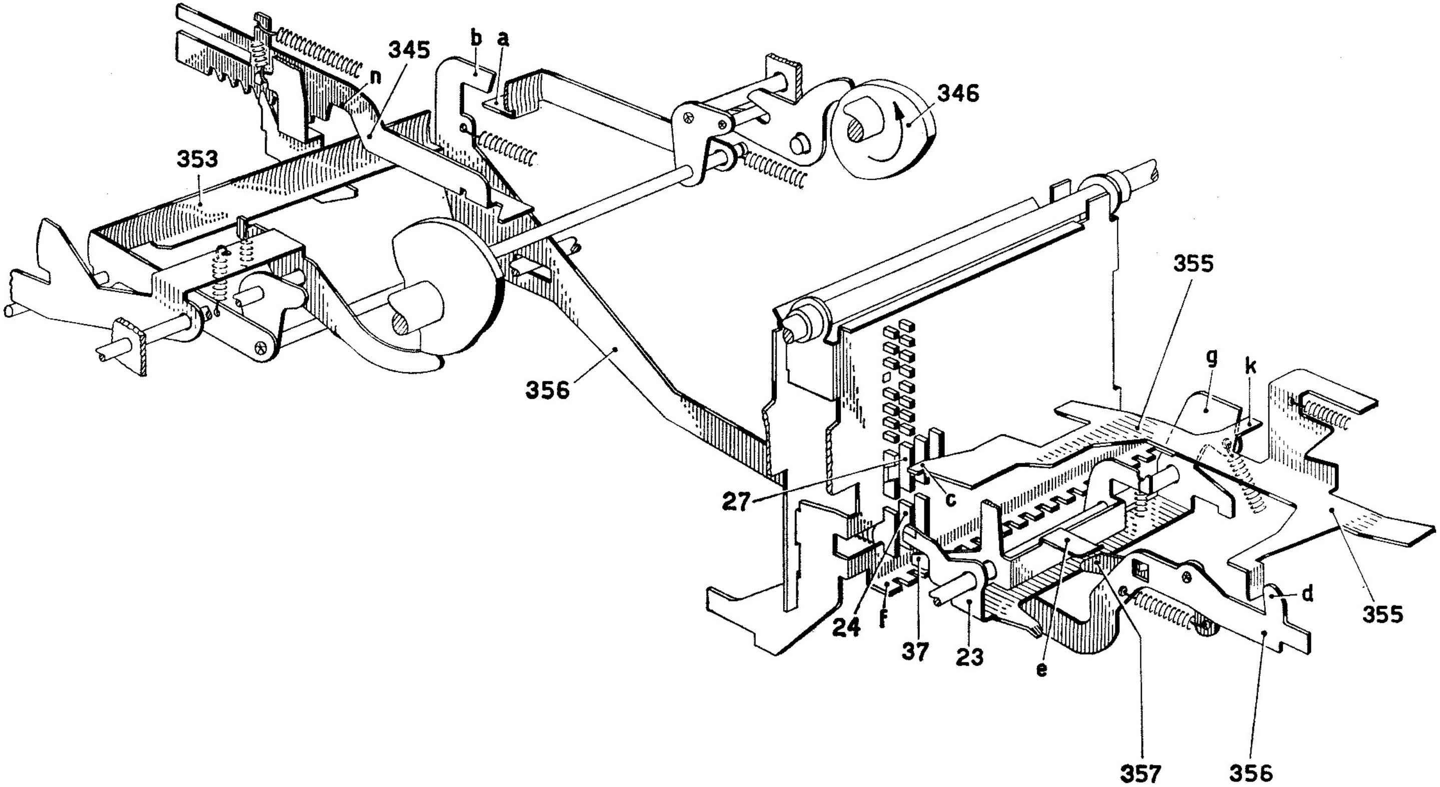
XXXVI - Slide escapement.

As we have seen at Chap. XXXV, in the last cycle concerning a memory rack, the bridge 353 can enter in the opening **n** of the tester 345 by moving upward. The wing **a** of the bridge 353 moves then in front of the extension **b** of the stay 356.

When at 150° of the cycle, the cam 346 moves the bridge 353 back to bring the tester back to rest, the wing **a** of the bridge 353 pushes back the stay 356. This latter, through its extension **d**, pushes back the plate 355 which with its setting finger **c** sets the stop 27 of the zero which is at the right of the multiplicand columns already set (at the right of the first left column in the figure). At the same time, the small pawl 357 pivoted on the stay 356 acts on the wing **o** of the fixed dog 37 and carries it in engagement with the teeth **f** of the slide, while the wing **k** of the plate 355 actuates the arm **g** of the movable dog 23 and disengages it from the escapement stop 24.

At the end of the cycle, when the stay 356 and therefore the plate 355, the fixed dog 37 and the movable dog 23 have returned to rest position thanks to their own springs, the slide has moved one step leftward. Consequently, because of this displacement and of the stop 27 being set, the multiplicand stored in the slide is therefore multiplied by ten, while the small multiplication slide carries the testers in connection with the next memory rack.




345
b
a
n
346
353
355
356
g
k
27
c
24
f
37
23
e
d
355
357
356

XXXVII - Supplementary cycle control.

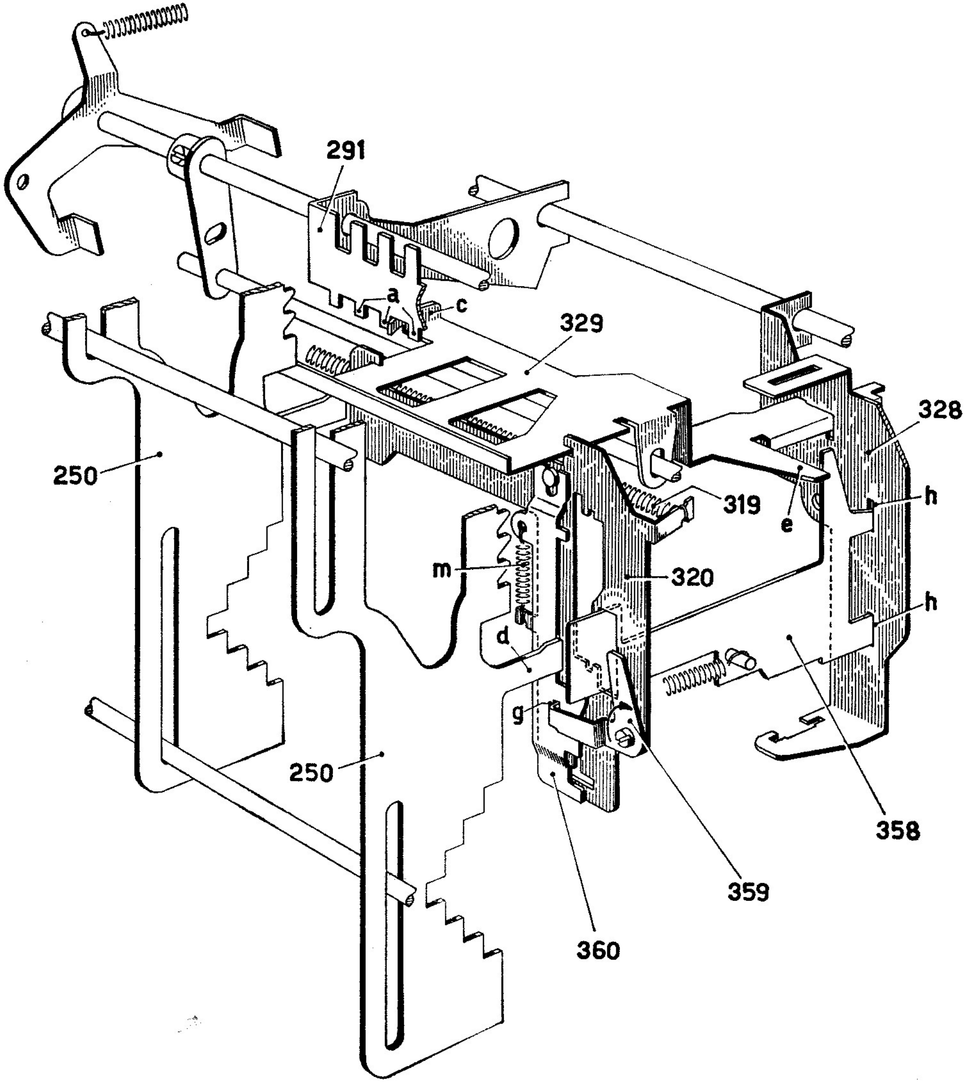
a) *Presetting.*

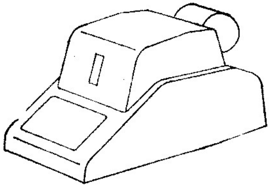
We have seen at Chap. XXVI that according to the short-cut multiplication method, if a multiplier digit is higher than four the next digit should be increased by one. In the figure we have illustrated a rack 250 in position seven and another in position nine.

On the front plate 320 of the small slide runs vertically a slider 360 which controls the operating sense tester (see par. *b*) as well as the cycles number tester (par. *c*). With the slider 360 engages a wing **g** of a lever 359 pivoted on the plate 320. The lever 359 rests also sideways against the front end of the supplementary cycle control tester 358. This tester is assembled in such a way to rotate around the slots **h** of the rear plate 328 of the slide and is usually held in the position illustrated in the figure by the lever 359 by the spring **m** connected between the plate 320 and the slider 360.

By depressing a multiplication key, the plate 329, by moving forward (Chap. XXXII), is followed by the tester 358 which rests against the wing **e** of the plate. At the end of the series of subtracting cycles concerning the multiplier digit higher than four, the entry slide trips one step leftward together with the bridge 291 (Chap. XXXVI). The small multiplication slide moves also one step actuated by the spring 319, as if the wing **c** of the plate 329 should not have a play between the lower teeth **a** of the bridge 291.

In this displacement, the front end of the tester 358 meets laterally with the extension **d** of the rack 250 on which we have operated. Since the spring 319 of the small slide is stronger than the spring **m**, the tester 358 is compelled to rotate around the slots **h**, moving its front end rightward by half-step about. The tester 358 rotates therefore the lever 359 in the direction of the arrow; this lever moves the slider 360 upward thus presetting the supplementary cycle (see par. *b*], *c*]).


291
a
c
329
328
250
319
e
h
m
320
h
d
g
250
358
359
360



b) *Operating sense of the machine.*

We have seen at par. *a*) that at the end of the subtracting cycles concerning a multiplier digit higher than four the tester 358 (fig. 1) moves the slider 360 upward. The slider 360 which engages with its wing **a** the horizontal slot **b** of the small plate 334 raises this latter with respect to the slider 333, thus carrying the small plate 334 to the position illustrated in the figure 2.

In the exploration movement of the operating sense tester 333, 334, the small plate 334 explores now the extension **d** of the next rack 250, as if this latter should have stored a multiplier digit higher than one unit. Consequently, if the new rack 250 is at zero (fig. 2), the wing **q** of the small plate 334 meets now with the wing **d** and the slider 333 thus presets an adding cycle (Chap. XXXIII) instead of a « non-add » cycle. If the rack 250 is at nine, the wing **r** of the small plate 334 doesn't meet with the wing **d** and the slider 333 presets a non-add cycle (Chap. XXXIV) instead of a sutracting cycle. If the rack 250 is in one of the positions from one to eight, the operating sense of the machine is not changed. Particularly, if the next rack 250 is in position four, since the wing **p** is fixed on the slider 333 and therefore it doesn't move vertically, the slider 333 will still be stopped by means of the wing **p**, thus presetting the register in addition, as usually.

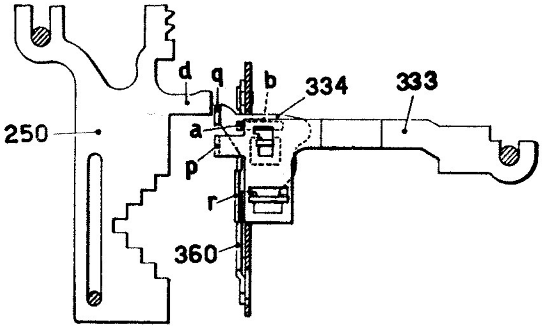

d
q
b
334
333
250
a
p
r
360

Fig. 2

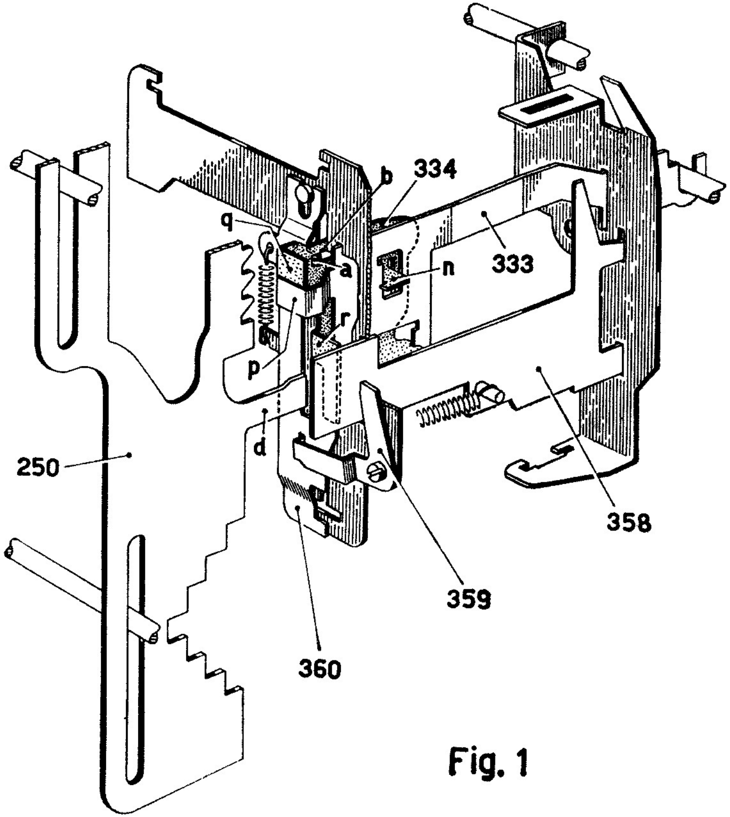
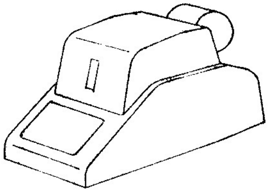

b
334
q
a
n
333
r
p
d
250
358
359
360

Fig. 1



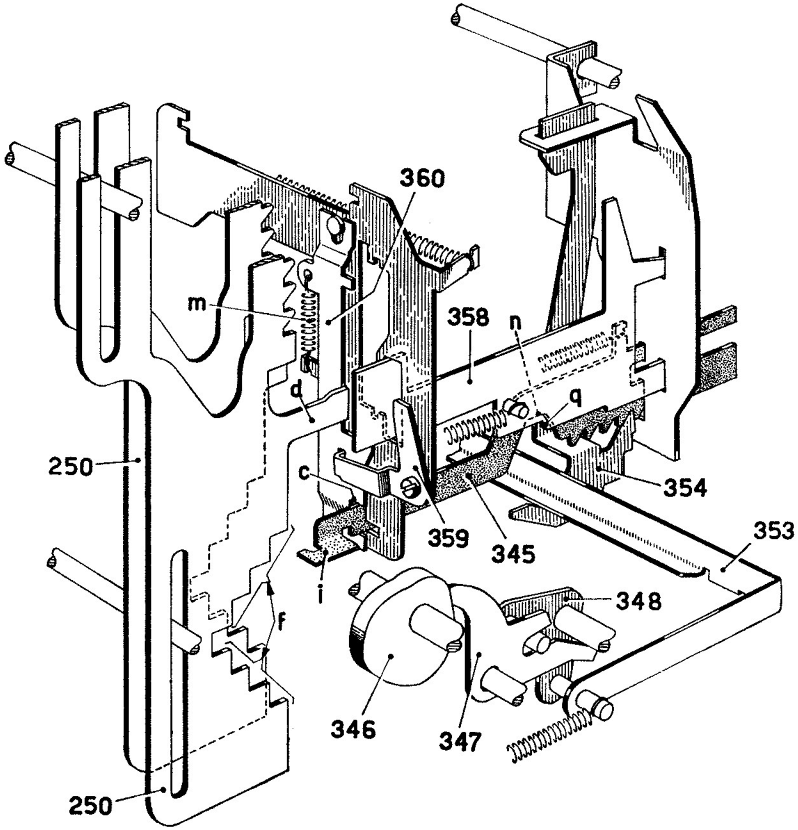
XXXVII - Supplementary cycle control.

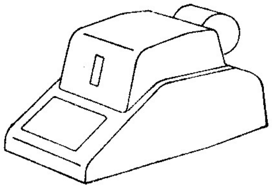
c) *Number of cycles.*

We have seen at par. *a*) that at the end of the subtracting cycles concerning a multiplier digit higher than four, the tester 358 moves the slider 360 upward. The slider 360 which engages with its opening **o** the tester 345 of the number of the cycles then raises the wing **i** of the tester 345 one step upward.

In front of the next rack 250 which in the figure is in position five, the wing **i** of the tester 345 will explore a step higher than the rack, thus increasing by one unit the value of the figure stored in the rack itself. Because of the double shaped stair **f**, it is easy to understand that for digits from one to four the tester 345 makes one step more and for the digits from five to eight one step less, modifying consequently the number of cycles to be performed.

When the bridge 353 enters in the chamfer **n** and comples the tester 345 to make the last step (Chap. XXXV, par. *c*), it meets also with the step **q** of the tester 358. This is pushed temporarily back and is disengaged from the extension **d** of the rack 250. The spring **m** brings then the device back to rest, while the bridge 353 controls the next step of the entry slide (Chap. XXXVI). The slider 358 returns forward still before the entry slide has completed its step, so that to be ready to stop if necessary against the extension **d** of the next rack 250.


360
m
358
n
q
d
250
c
354
353
359
345
i
f
348
346
347
250



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Garland, Texas
BR 6-8411

XXXVIII - Last multiplication cycle.

a) *Multiplication key release.*

At the end of the multiplication the key that had been depressed returns to rest position and the machine stops. We shall see therefore that in the last cycle of the multiplication the rod 322 moves on the trajectory of the wing **k** of the lever 365. This latter actuated by the cam 364 pushes the rod 322 downward thus moving the lever 313 back to rest as well as the organs connected to it (see Chap. XXVIII).

To stop the machine we should obtain the following conditions:

— the racks 250 at the left of that on which we operate should all be at zero;

— the cycles number tester 345 should be at rest;

— the operating sense tester 333, 334 should test a rack 250 to determine an adding cycle; that is the last cycle of the multiplication should be an adding one.

We have seen that by depressing a multiplication key, the rod 322 moves upward thus allowing the lever 321 to rotate and to move to the position illustrated in the figure 1. The wing **b** of the lever 321 is now resting against the arm **e** of the lever 362, while the pin **f**, by means of the slot **g**, holds the rod 322 out of the trajectory of the wing **k**. Furthermore, the universal bar 324 carried by the arm 323 integral with the lever 321 has moved forward the plate 329 which, with the wing **c**, has hooked the small multiplication slide to the bridge 291 (fig. 2) and therefore to the entry slide (Chap. XXXII).

In the interval between 160° and 195° of the cycle, the cam 363 of the main shaft 53 allows the lever 362 to rotate in the direction of the arrow thus leaving the wing **b** of the lever 321. This lever tends rotating in the direction of the arrow but it is normally held back because the plate 329 stops immediately with the bent **t** against the rear profile **b** of the racks 250 which are at the left of that on which we operate and that are in position different than zero. When the small slide is anyhow in front of the rack of the higher multiplier digit, as in the figure 1, the plate 329 is in front of the opening **m** of the left racks 250 which are all at zero (fig. 2).

We have seen that during the multiplication, the bridge 352 is in the position illustrated in the figure 1 and that it is rotated in the direction of the arrow when the bridge 353 compels the cycles number tester 345 to make the last step (Chap. XXXV). Normally the end of the bridge 352 is on the trajectory of the wing **s** of the lever 321 and moves from it only in the interval between 150° and 300° of the last cycle concerning a rack 250, when the tester 345 makes the last step toward the rest position.

In the interval between 35° and 230° of every cycle, the axle 331 which controls the forward movement of the tester 333, 334, rotates the bridge 361 in the direction of the arrow around the axle 295. When the tester 33, 334 is

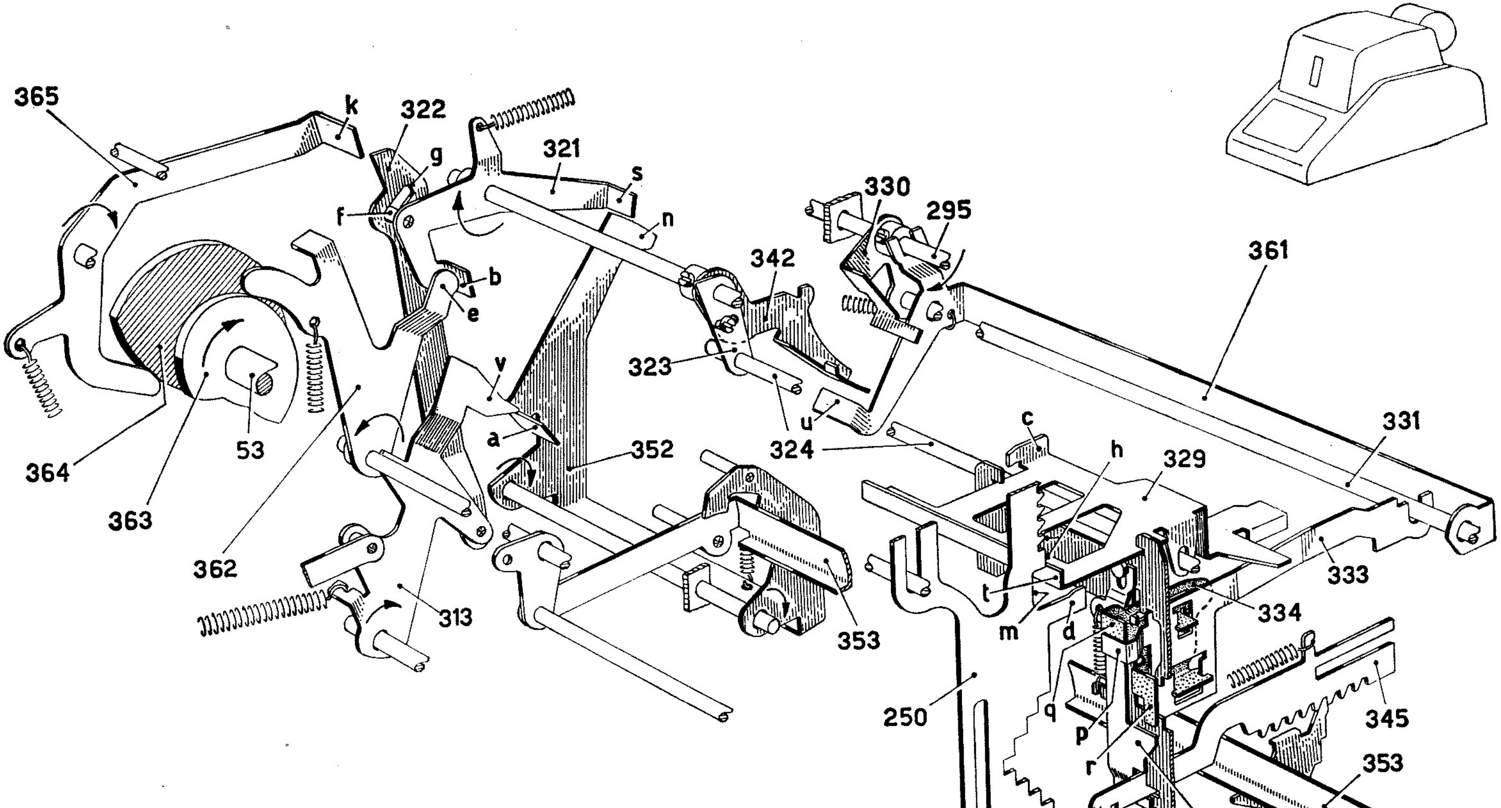

365
k
322
g
f
321
s
n
b
e
364
363
53
362
v
a
352
313
342
323
324
u
330
295
361
331
c
h
329
333
t
m
d
334
q
p
r
360
250
345
353

Fig. 1

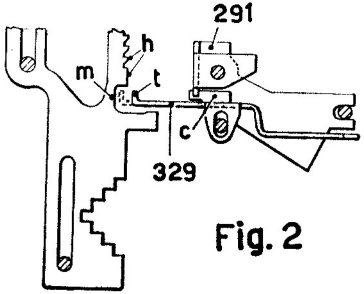

291
h
m
t
c
329

Fig. 2

stopped through the wings **p** and **q** by the extension **d** of the racks 250 (adding position), the wing **u** of the bridge 361 is out of the trajectory of the arm 342. When, on the contrary, the tester 333, 334 is stopped through the wing **r** (subtracting position) and when it advances completely to preset a non-add cycle, the bridge 361 makes a greater rotation carrying its wing **u** on the trajectory of the arm 342. In these two last cases the lever 321 cannot therefore rotate.

Concluding, the lever 321 can rotate in the direction of the arrow only if it is released at the same time from the lever 362, from the racks 250 at zero, from the bridge 352 and from the bridge 361. This condition takes place between 160° and 195° only of the last multiplication cycle. When the lever 321 can rotate at last it moves, by means of its pin **f** and the slot **g**, the rod 322 on the trajectory of the wing **k** of the lever 365. At 180° of the cycle, this lever starts rotating in the direction of the arrow actuated by the cam 364 and pushes the rod 322 down. This latter rotates the lever 313 in the direction of the arrow thus locking with the extension **v** the wing **s** of the bridge 352 in rotated position and releasing the multiplication key (Chap. XXVIII) which returns to rest position.

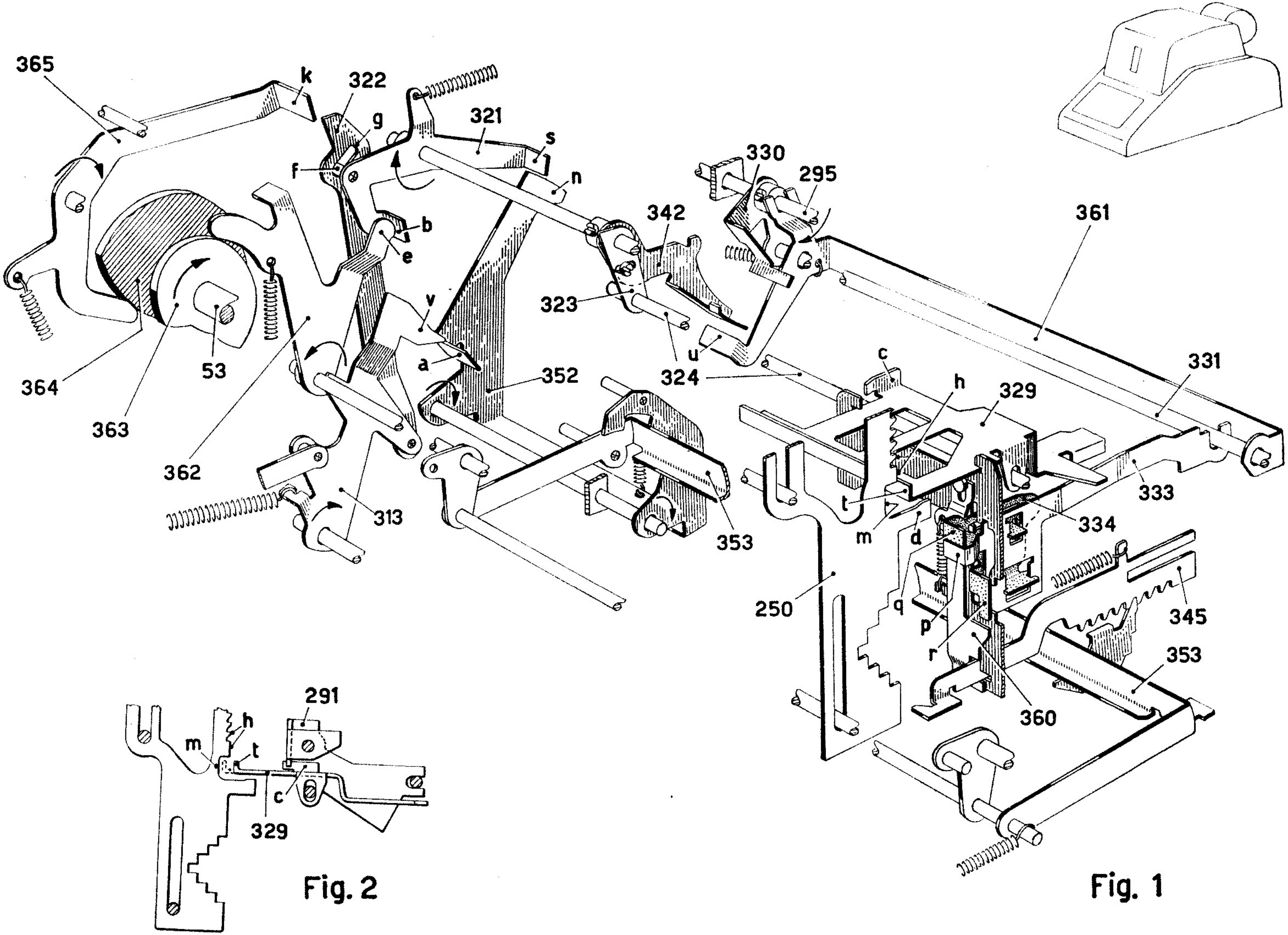

365
k
322
321
g
s
f
n
330
295
342
b
e
361
323
y
a
324
u
352
c
331
h
329
364
53
363
362
313
353
t
m
d
333
334
q
p
r
250
345
353
360

Fig. 1

291
h
m
t
c
329

Fig. 2

b) *Slide restoring and small slide hooking.*

As we have seen in the precedent page, in the last cycle of the multiplication, the lever 321 rotates in the direction of the arrow carrying the upper end of the rod 322 under the wing **k** of the lever 365. At 180° of the cycle, the lever 365 actuated by the cam 364 lowers the rod 322 moving it back to rest position. The rod 322 rotates now, by means of its slot **g**, the lever 321 in the direction opposite to that of the arrow moving therefore the plate 329 back to rest and disengaging its wing **q** from the bridge 291. The small multiplication slide is thus disengaged from the entry slide and, through the action of the spring 319, trips leftward until it stops with the wing **q** of the plate 329 against the arm **m** of the bridge 291.

Since in this cycle the multiplication key returns to rest, the slide restoring mechanism is released (see Chap. XXIX). At the end of the cycle, the slide is brought back to rest; consequently the multiplicand is cleared (see Chap. XII). Furthermore, since the bridge 291 is connected to the entry slide (Chap. XXVII) it is brought back toward the right to rest position thus dradding the small multiplication slide by means of the wing **c** of the plate 329. When the plate 329 reaches the rest position its extension **b** which has met with the hook 327, is thus rehooked at rest.

c) *Multiplication stopping for lack of multiplier.*

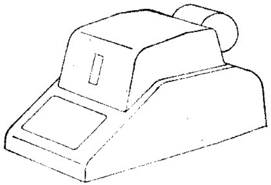
If there is no figure stored in the memory and we start a multiplication, the tester 333, 334 presets a non-add cycle and therefore the machine should not stop. Yet, when the small multiplication slide is on the first memory column, the end **s** of the slider 333 holds the bridge 361 moved to the right, as illustrated in the fig. 2, and its wing **u** is in connection with the opening **z** of the arm 342. This latter can therefore rotate and control the stopping of the machine as in the case illustrated at par. *a*).

d) *Multiplication stopping on the memory column.*

When by accident the multiplication is not stopped correctly, especially in the case where the small plate 334 is not stopped by the extension **d** of the rack 250 at the left of the higher multiplier digit greater than four, the machine makes a non-add cycle for every rack 250. In connection with the last memory column, that is in connection with the 12th rack 250, the lug **i** of the bridge 291 moves in front of the wing **h** of the arm 330 preventing in this way the forward movement of the tester 333, 334. The machine makes therefore an adding cycle in which all the conditions of the last multiplication cycle are created (par. *a*); consequently, the machine stops at the end of the cycle.

e) *Multiplication key release for lack of multiplicand and by excess of factors.*

When by depressing the multiplication key the operation is not started that is for lack of multiplicand or when the product of the two factors exceeds the capacity of the machine (Chap. XXVIII), in the first cycle done (generally a correction cycle) all the conditions of the last multiplication cycle take place (par. *a*). Consequently, in this cycle the lever 365 pushes down the rod 322 which moves thus back the multpilication key and clears the multiplicand entered in the slide.



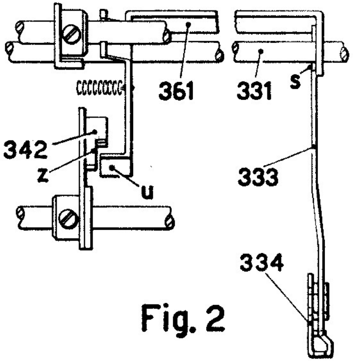

361
331
s
342
z
u
333
334

Fig. 2

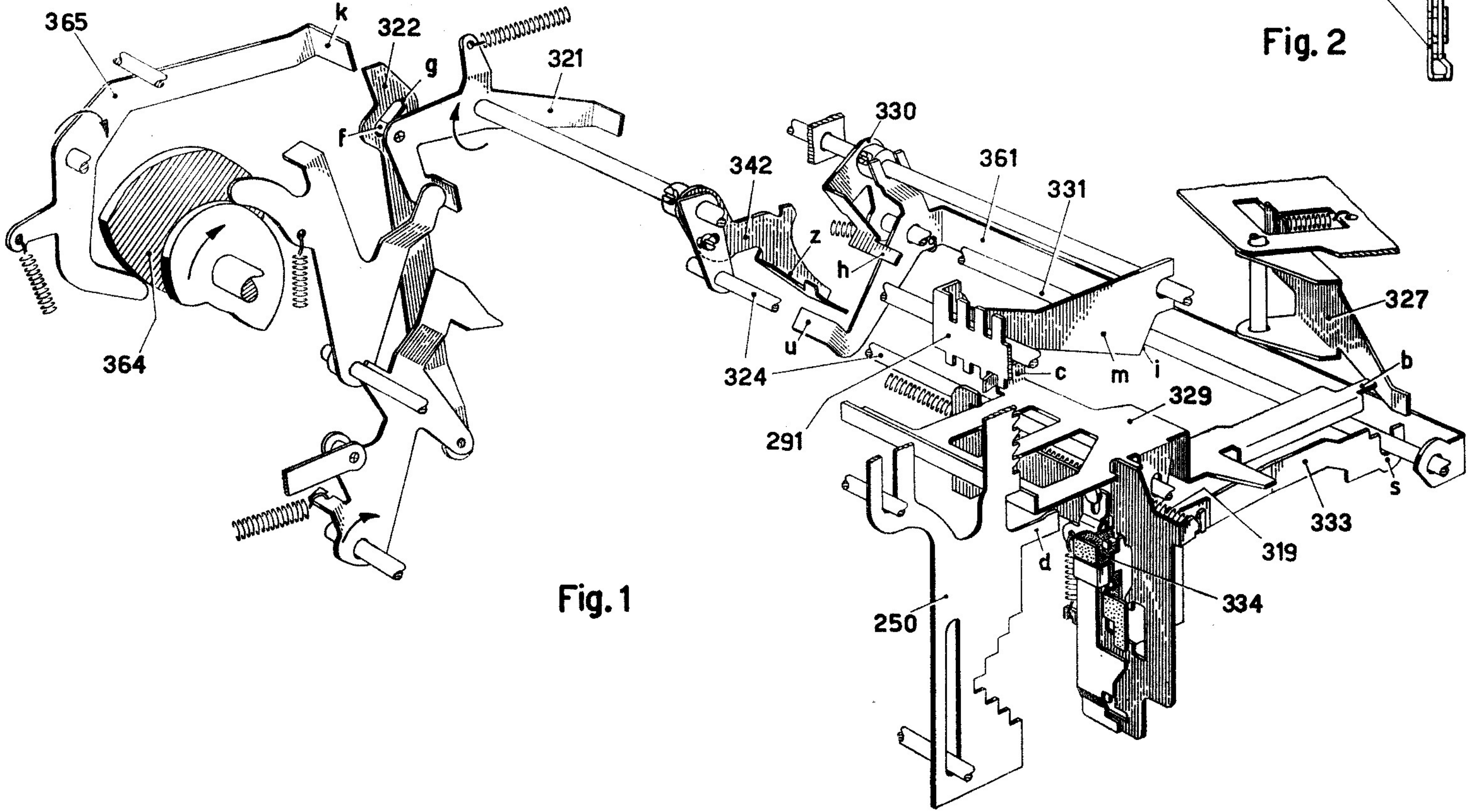

365
k
322
g
f
321
364
330
342
361
331
z
h
g
u
324
291
c
m
i
327
b
329
s
333
319
334
d
250

Fig. 1

XXXIX - Automatic printing of the product.

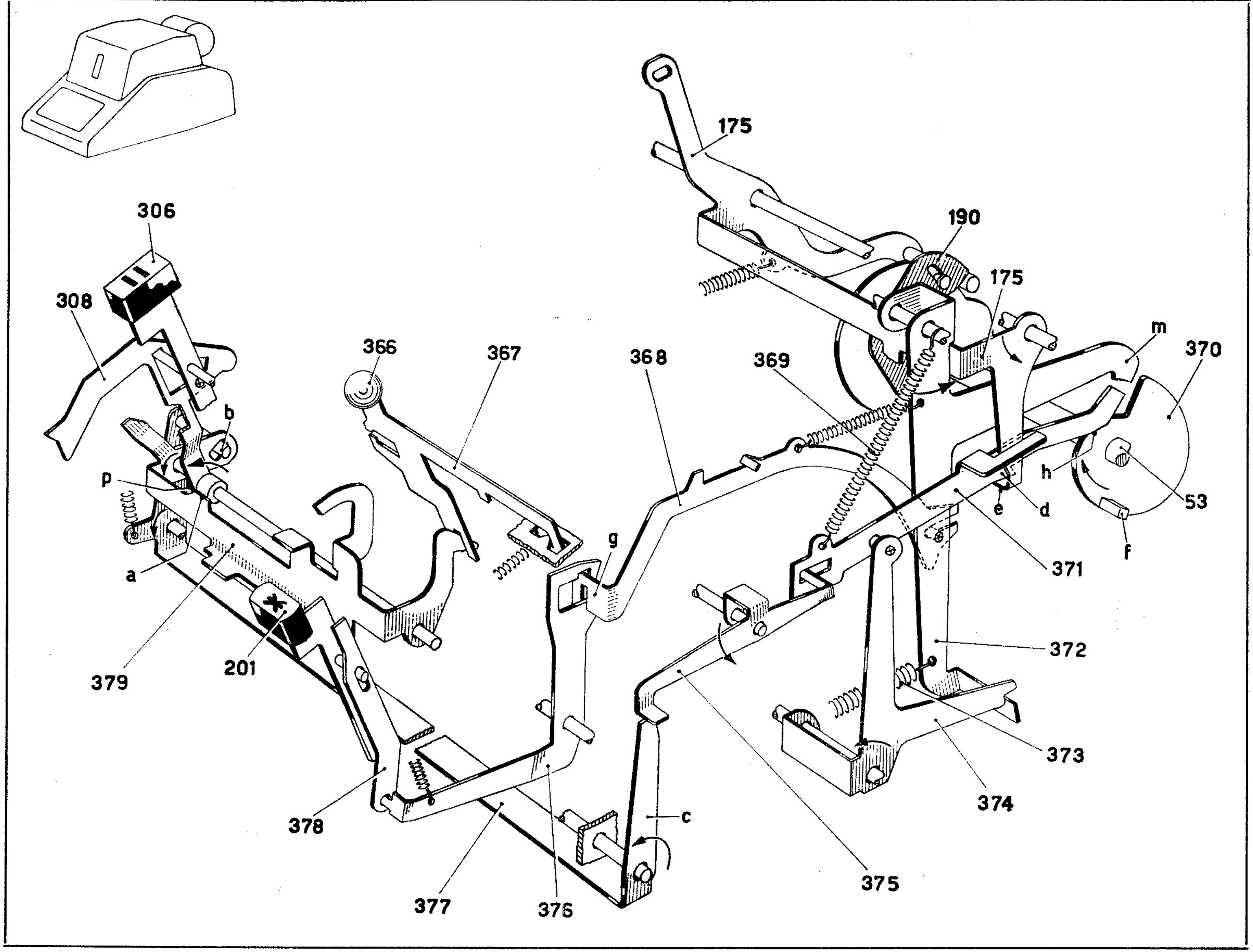
By moving the automatic button 366 leftward, its stem 367 drags the bridge 379 to the left; this bridge carries its extension **a** on the trajectory of the profile **p** of the lever 308. If we now depress a multiplication key, the lever 308, by rotating in the direction of the arrow, drags the bridge 379 which at its turn, through the pin **h** rotates the bridge 377 also. The arm **c** of the bridge 377 thus releases the lever 375 which rotates in the direction of the arrow and allows the rod 371 to move with the lug **d** on the wing **e** of the clutchrelease bridge 175. This latter at the beginning of the multiplication rotates in the direction of the arrow thus releasing the small plate 190 of the clutch (Chap. XVI) and remains in rotated position until the key 306 returns to rest, that is during all the multiplication cycles.

With the rotation of the bridge 175, the lug **d** of the rod 371 remains hooked in front of the wing **c**. At every multiplication cycle, the pin **f** of the cam 370 of the main shaft 53 actuates for an instant the profile **h** of the rod 371 thus disengaging the lug **d** from the wing **e**. Since the bridge 377 remains rotated, the rod 371 re-hooks immediately the bridge 175. At 270° about of every cycle, the cam 370 actuates the arm **m** of the servomechanism 372 which is rotated in the direction of the arrow against the action of the spring 373 releasing in this way the hook 374. Until the bridge 175 is rotated, this movement is void.

In the last multiplication cycle, while the cam 370 rotates the servomechanism 372, the bridge 175 returns to rest position thanks to its own spring and drags the rod 371 forward thus rotating the hook 374 in the direction of the arrow. Since in that instant the hook 374 is free from the servomechanism 372, the bridge 175 must win the spring 369 only, which is weaker than the spring 373, to be able to push the rod 371 forward.

At the end of the cycle, the cam 370 leaves the arm **m** of the servomechanism 372 which trips in the direction opposite to that of the arrow actuated by the spring 373 thus pushing the rod 368 forward. Through its wing **g** the rod 368 rotates the lever 376 which, by means of the stay 378, lowers the total key 201 of the second register. The product of the multiplication is therefore automatically released and printed on the tape.

During this cycle of total, the pin **f** of the cam 370 actuates the lower profile **h** of the rod 371 which is released from the bridge 175. Since the key 306 is now returned to rest together with the bridge 377, the lever 375 can be re-hooked to rest position by the arm **q** of the bridge 377. Furthermore, during this cycle, the cam 370 actuates the arm **m** of the servomechanism 372 thus re-hooking this latter to the hook 374; consequently, all the mechanism returns to the position illustrated in the figure.


m
b
p
h
e
d
a
g
f
c

XL - Re-entry of the products into the memory.

By depressing the key 380 concerning the re-entry of the product, the wing **n** of its stem depresses the positive multiplication key 306, while the pin **p** lowers the hook 384 which engages with the wing **q** of the bridge 276. If the automatic button 366 has been moved to the left, the bridge 379, when rotating to preset the servomechanism 372 release (Chap. XXXIX), engages also with its extension **r** the wing **s** of the hook 384. At the end of the multiplication, when the servomechanism 372 releases the automatic printing of the product, the plate 196 rotates, by moving backward, the arm 198 together with the arm 210 with which it is integral in the direction of the arrow. The bridge 276 follows the arm 210 and, through its wing **q**, drags the hook 384 back which rotate the bridge 266 in the direction of the arrow thus presetting the re-entry of the released product into the memory.

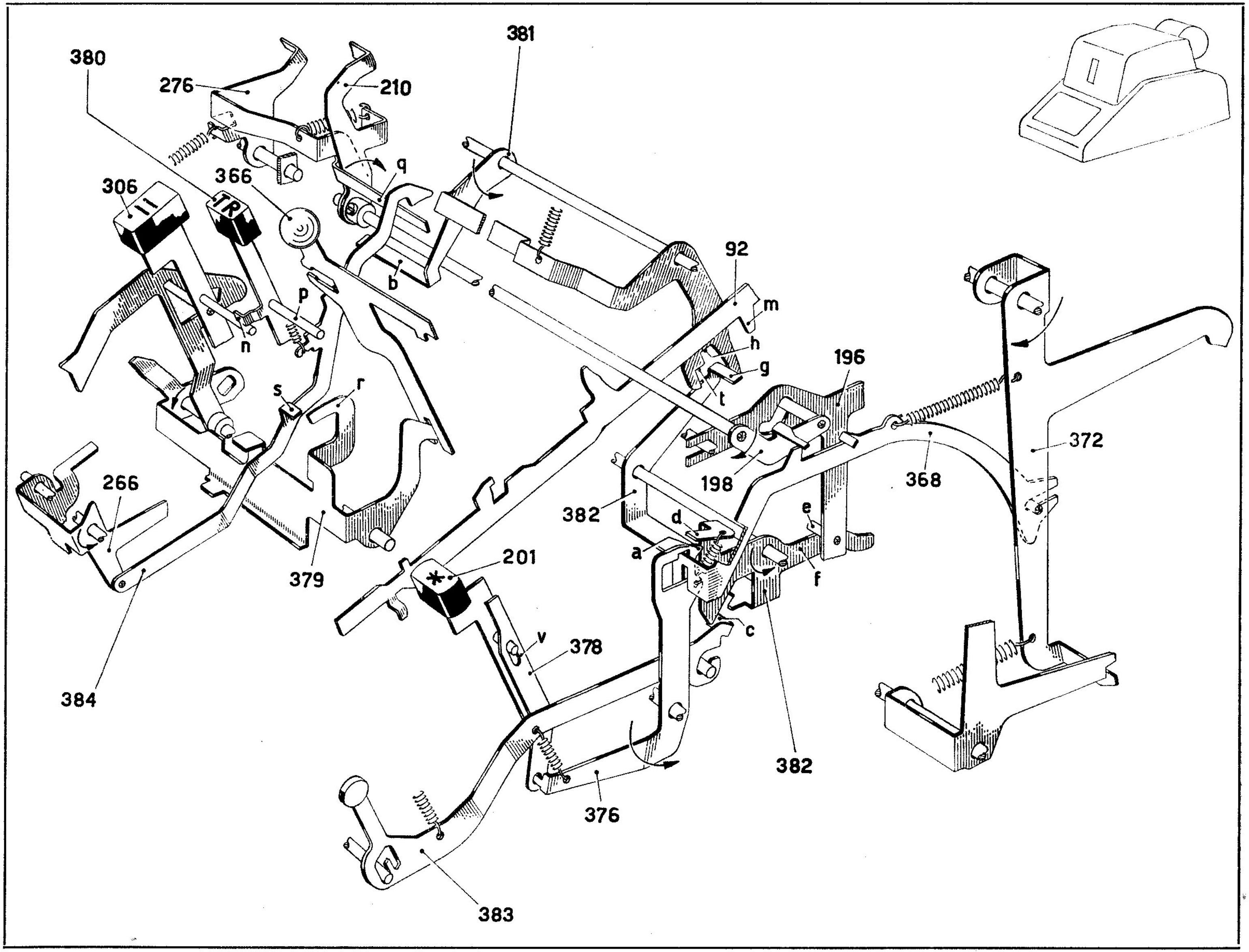
XLI - Accumulation of products and totals.

a) *Tetractys.*

If we desire to accumulate in the first register the products obtained in the second register, beside setting the automatic button 366, we must also move forward the accumulation slider 383, thus moving the wing **c** out of the trajectory of the bridge 382. When at the end of the multiplication the servomechanism 372 is released (see Chap. XXXIX), the rod 368 carries the extension **a** of the lever 376 out of the trajectory of the wing **d** of the bridge 382. At last, in the presetting extra-cycle of the total, the plate 196, by moving back, releases from the pin **e** the arm **f** of the bridge 382 which can rotate at last in the direction of the arrow. The wing **g** of the bridge 382 then enters in the opening **h** of the bridge 381 getting placed on the trajectory of the lug **m** of the first register engagement control slider 92. The slider 92 is thus stopped in adding position (Chap. VI, par. *b*); consequently, the product released from the second register is accumulated in the first register.

If the slider 383 is moved forward and the second register total key 201 is depressed by hand, because of the reduced size of the slot **v** of the stay 378, this latter is dragged down rotating the lever 376 in the direction of the arrow, as the rod 368 had moved forward. All the conditions seen above take therefore place; consequently, the total released from the second register is accumulated algebraically into the first one (Chap. XVII, par. *b*).

When the produc is re-entered into the memory (Chap. XL) it is necessary preventing it eing accumulated in the first register also. This is why, when the hook 384 is lowered by the pin **p** it actuates the wing **b** of the bridge 381 which is rotated in the direction of the arrow. The bridge 381 with its step **t** locks the wing **g** of the bridge 382 thus preventing the engagement of the first register even when the slider 383 is in forward accumulation position.


380
276
210
381
306
TR
366
q
b
p
n
92
m
h
g
196
t
s
r
372
198
368
266
382
e
d
a
201
*
f
379
c
v
378
384
382
376
383

XLI - Accumulation of products and totals.

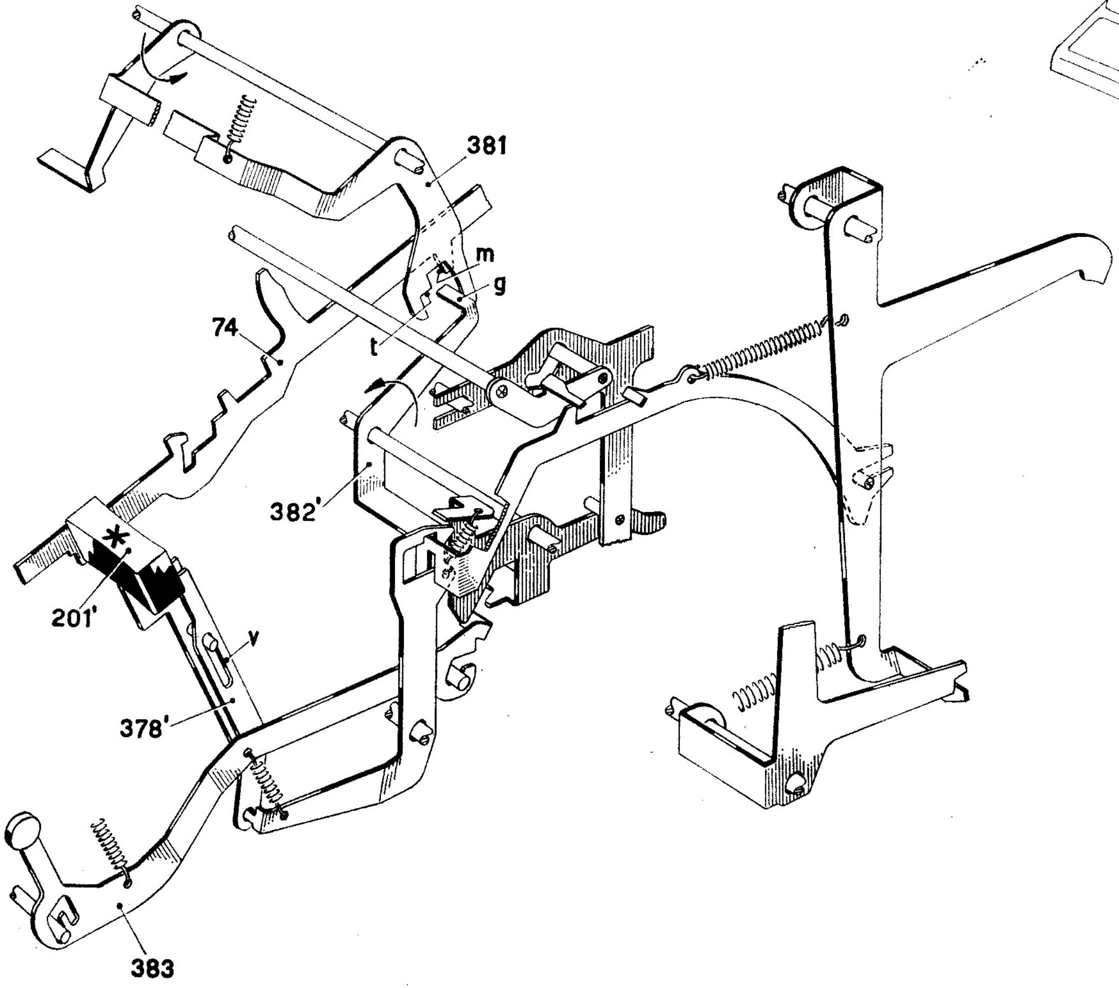
b) *Divisumma.*

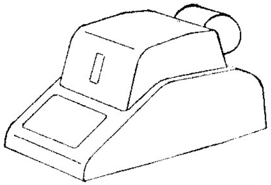
The Divisumma 24 doesn't include the first register; this is why the products cannot be accumulated in it. The accumulation slider 383 is therefore used only to hold the product in the single register after having printed it during a sub-total cycle. The products are consequently accumulated progressively in the register while on the paper-tape are printed the successive amounts of the products.

This is why the bridge 382′ of the Divisumma has the wing **g** turned to the left. When the accumulation slider 383 is moved forward and we want a product, the bridge 382′ is rotated in the direction of the arrow, as described in par. *a*). It then carries its wing **g** on the trajectory of the lug **m** of the engagement control slider 74 of the single register of the Divisumma 24. During the cycle, the forward travel of the slider 74 is stopped in connection with the sub-total position (Chap. XVII, par. *c*); consequently at the end of the cycle the product remains in the register.

The stay 378′ of the Divisumma 24 has the slot **v** longer than that of the Tetractys stay (precedent page); consequently, when the Divisumma 24 total key 201′ is depressed it doesn't drag the stay 378′ down. The bridge 382′ is not rotated even if the slider 383 is displaced forward; consequently the machine will perform a total cycle.

If the product is re-entered into the memory, just as it happens in the Tetractys (par. *a*), the bridge 381′ is rotated in the direction of the arrow to move its step **t** on the trajectory of the wing **g**. This latter doesn't move now one the trajectory of the step **m** of the slider 74 which controls then the register engagement for total.


381
m
g
74
t
382'
*
201'
v
378'
383



XLII - Division - Foreword.

The dividend is entered in the second register either as a result of precedent operations or through the entry slide by means of an adding cycle. The divisor is entered in the slide after the dividend has been entered. Then by depressing the division key 393 the machine performs a subtotal cycle during which the dividend is printed on the tape, the automatic tabulation of the divisor with the dividend is preset and the figure that could be in the memory is cleared. After this cycle, begins the division which is performed by repeated subtractions during which the quotient is stored in the memory.

According to this metrod every digit of the quotient is obtained by subtracting repeatedly the divisor from the dividend until the dividend is smaller than zero, that is until the dividend is surpassed, after which the divisor is added once to correct the mistake due to the surpassing. The number of subtracting cycles performed, less one, represents the figure of the quotient; the result obtained in the register after the adding cycle represents the remainder. To obtain the other digits of the quotient the divisor is moved one step to the right and the machine starts again subtracting it from the remainder found for the first digit.

XLIII - Presetting the machine for division.

a) *Exclusion of slide restoring.*

By depressing the division key 393, the lever 394 rotates in the direction of the arrow and, through its wing **a**, the bridge 167 and the stay 168, it carries the rod 169 to repeat position to exclude the slide restoring at the end of every cycle (Chap. XIII).

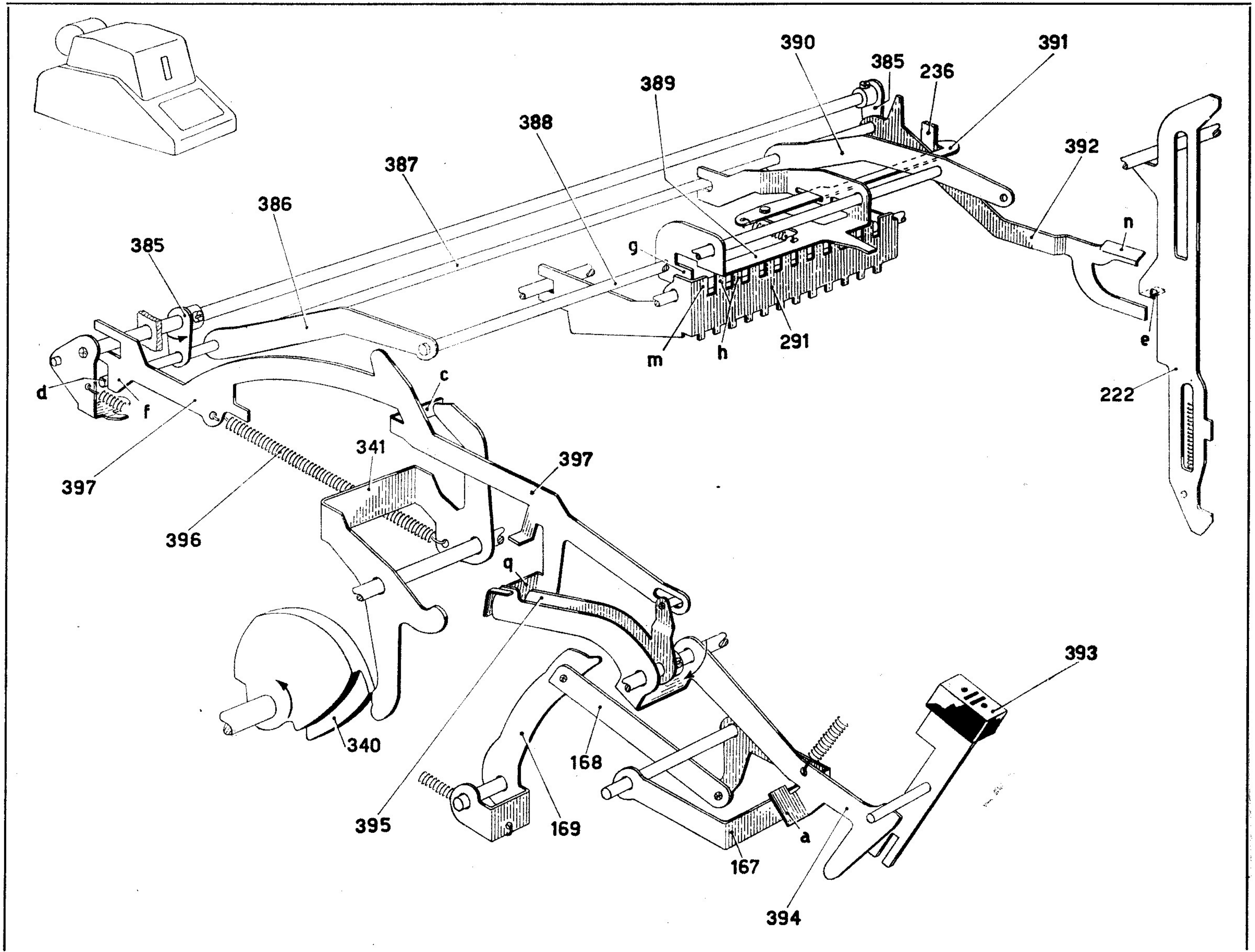
b) *Hooking of the small division slide.*

The lever 394, by rotating in the direction of the arrow, releases the wing **q** of the slider 397 which through the spring 396, moves forward and goes resting with the wing **c** against the bridge 341. The slider 397 cannot however follow the movement of the bridge 341 during the cycle because after a short travel it goes resting with the wing **q** against the lever 395. The arm 385 which rests, by means of the end **d** of the axle 387, against the lug **f** of the slider 397, by following it, rotates in the direction of the arrow thus moving forward the frame including the two arms 386 and 390 and the two axles 387 and 388. On these two axles runs the small division slide 389 which, by moving forward, disengages the hook 391 from the right internal side-plate 236 of the machine and also engages its extension **g** between the upper teeth **h** of the bridge 291. This latter, by moving always with the entry slide (Chap. XXVII), has already moved leftward after the entering of the divisor in the slide. The small slide 389 is therefore integral with the entry slide for all the division.

In case the key 393 is left without having entered the divisor, the bridge 291 is at rest as illustrated in the figure and, by means of its tooth **m**, stops the extension **g** and prevents therefore the engagement of the small slide with the bridge.

c) *Presetting the special signs printing.*

When the small slide 389 moves forward meshing with the bridge 291, the connecting-rod 392 pivoted on the axle 387 is pushed forward and carries its wing **n** on the trajectory of the wing **e** of the second register special signs printing slider 222 (Chap. XVIII). When the dividend is printed (Chap. XLIV) and when the divisor is also printed (Chap. LII), the connecting-rod 392 is displaced forward and the slider 222 stops against the wing **n** after having made two steps upward thus presetting the printing of the sign « : » near both dividend and divisor. The first register special signs printing slider presets on the contrary the printing of the non-add sign « < » (Chap. XVIII).


n
g
c
d
f
m
h
e
q
a

XLIII - Presetting the machine for division.

d) *Memory clearing.*

By depressing the key 393 the pin **d** moves backward the slider 267 which rotates the bridge 266 in the direction of the arrow. This bridge pushes the slider 272 backward; the slider presets the memory clearing (see Chap. XXIII).

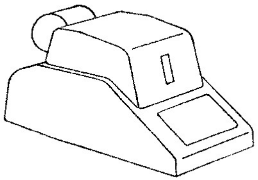
XLIV - Printing of the dividend.

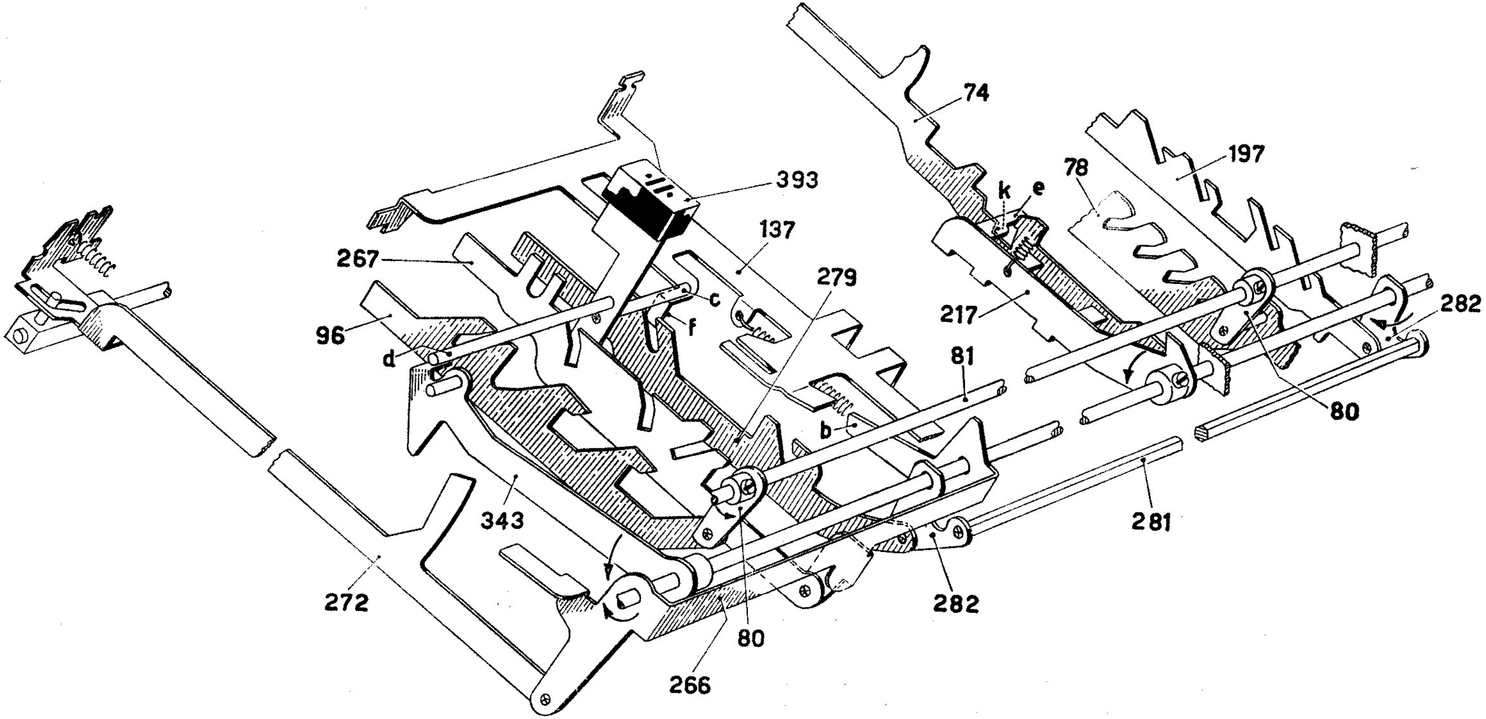
By depressing the key 393 the pin **c** moves first backward the slider 279 connected through the arms 28 and the axle 281 to the extra-cycle control slider 197 (Chap. XVI); then it moves in front of the wing **f** of the plate 137 instead of the arm **b** of the bridge 266, to stop the plate 137 and excluding in this way the engagement of the memory racks with the executers.

The pin **d** of the key 393 moves at its turn forward the slider 96 which, through the crank 80 and the axle 81, moves forward the clutch release slider 78 thus closing the motor circuit. At last, the pin **d** rotates the arm 343 together with the lever 217 integral with in the direction of the arrow. The lever 217 rotates in a way to place its wing **e** on the trajectory of the step **k** of the slider 74, thus presetting the engagement of the second register for sub-total (Chap. XVII).

In this sub-total cycle the memory is excluded, while the dividend is printed in red on the tape and, at the end of the cycle, we find it again in the register. Furthermore, at the end of the cycle, the key 393 returns to rest position.

In the printing cycle of the dividend, since the sub-total key is not depressed, the second register engages always the adding wheels with the executers. If there is a negative figure in the register the machine will therefore print on the tape its complement to nine. After this cycle the division will not be started, as we shall better see at Chap. XLVI, par. *b*).




74
197
78
k
e
393
137
279
267
96
d
c
f
217
282
81
b
80
343
281
272
80
282
266

XLV - Automatic tabulation.

a) *Presetting the tabulation.*

When by depressing the division key the slider 397 moves forward (right-ward in the figure 1) and allows the arm 385 to rotate in the direction of the arrow (Chap. XLIII), the arm 398 integral with the arm 385 lowers the connecting-rod 400 which rotates the anchor 401 in such a way to carry its lug **a** in connection with the wing **b** of the arm 402. In the first half part of the printing cycle of the dividend (Chap. XLIV), the cam 147 of the main shaft 53 rotates the lever 399 in the direction of the arrow to move slowly forward the anchor 401 which rotates then the arm 402 in the direction of the arrow.

The arm 404 integral with the arm 402 pushes forward the two small and similar frames 405 and 406 pivoted on it and connected one another by the small spring **c**. The small bar **q** of the frame 405 is engaged with the first tooth **d** of the plate 407 and pushes it forward. On the plate 407 is pivoted the testing arm 409 supplied with a set of wings **e** placed diagonally and spaced one another as the executers 11.

The arm 409 rests normally with the third wing **e** under the lug **f** of the first left executer 11 (right in the figure 1). During the forward travel of the plate 407 the wings **e** of the arm 409 test sucessively all the executers 11 from the left one. Until the wings **e** test the executers at zero (low position) each wing **e** arrives when moving forward, under the opening **g**, it cannot enter in it because the wing **e** immediately at the right is at its turn resting against the lug **f** of the corresponding executer.

When a wing **e** is in connection with the first left executer 11 which in the dividend printing cycle has moved upward (that is in connection with the higher digit of the dividend), it doesn't find the lug **f** against which to rest. The arm 409 can then rotate upward engaging the wing **e** immediately at the left with the opening **g** of the corresponding executer which is naturally at rest (see par. *e*). The forward travel of the plate 407 is therefore stopped and the arm 409 places one of its wing **c** on the trajectory of the extension **h** of the entry slide thus presetting the stopping of the slide (fig. 2).

In the next forward travel of the small frames 405 and 406 the small bar **q** skips on the teeth **d** of the small plate 407. The spring-stabilizer 403 holds the arm 402 as well as the arm 404 in rotated position.

If the dividend occupies all the capacity of the register, even the first left executer 11 moves up, the arm 409 rotates immediately and is stopped by the wing **m** of the small fixed plate 408. In this case no wing **e** is placed on the trajectory of the extension **h**.

The plate 407 will move back to rest in the first cycle which follows the returning to rest of the slider 397, that is after the last division cycle (Chap. L). In fact, the arm 398 will be moved to rest only then. This arm, through the connecting-rod 400 will move the lug **n** of the anchor 401 in connection with the wing **p** of the arm 402. This latter will thus be rotated in the direction opposite to that of the arrow in the first half-part of the cycle.

If no divisor digit has been entered in the slide, the arm 385 cannot rotate in the direction of the arrow because the small division slide cannot engage the entry slide (Chap. XLIII). The arm 398 doesn't lower therefore the anchor 401 and the arm 409 is not moved forward; consequently, even now it places no wing **e** on the trajectory of the extension **h** of the slide.

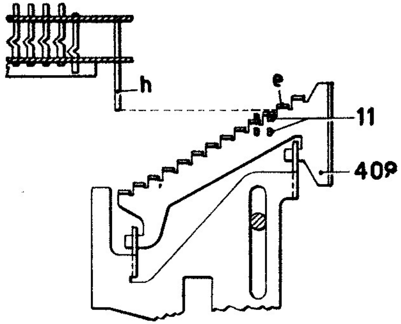

h
e
11
409

Fig. 2

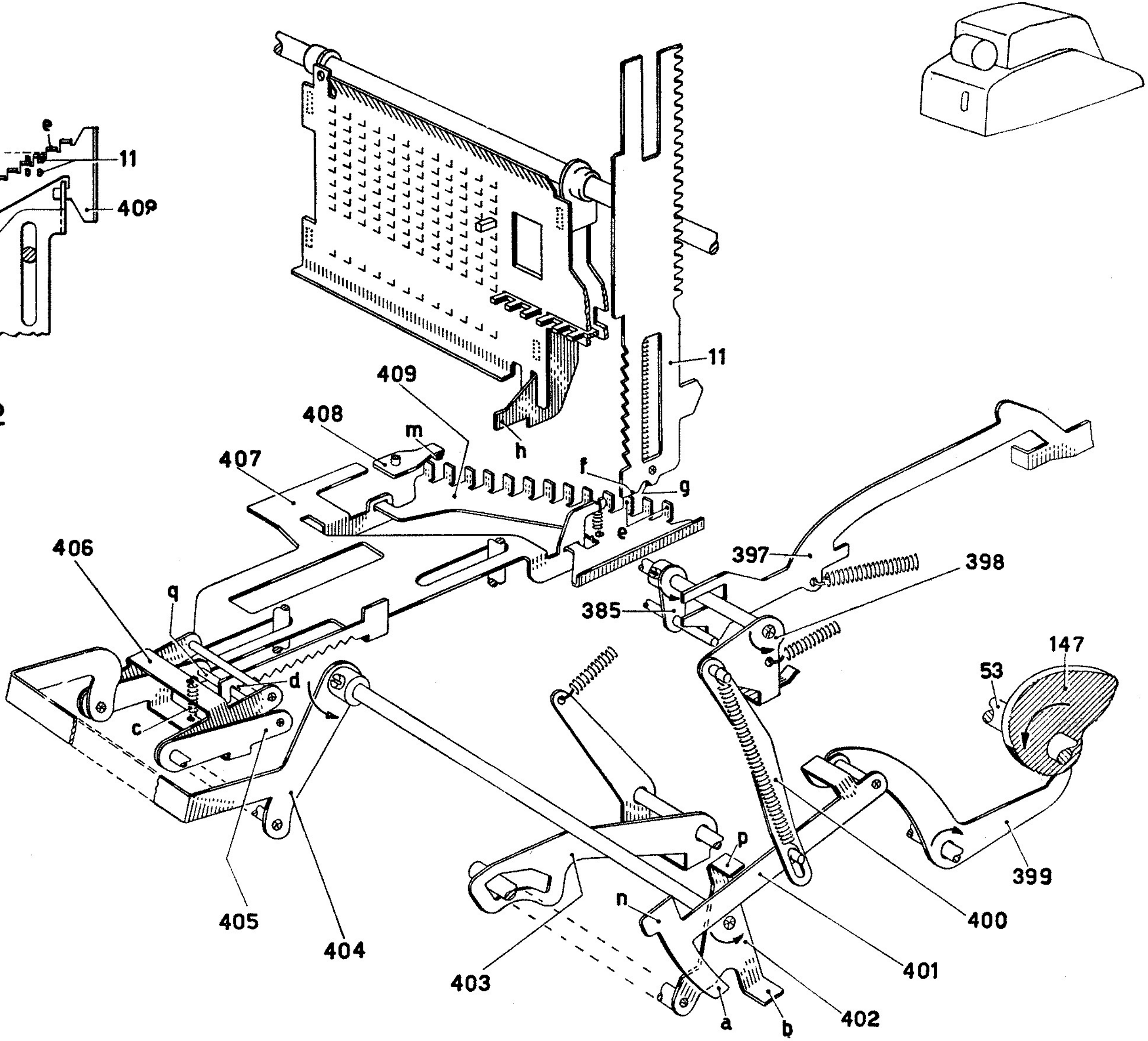

11
409
408
m
407
h
f
g
e
406
q
397
398
385
147
53
d
c
405
404
403
p
n
a
b
402
401
400
399

Fig. 1

XLV - Automatic tabulation.

b) *Slide release.*

By depressing the division key 393, the lever 394, by actuating the wing **d**, rotates the bridge 379 in the direction of the arrow. This bridge, through the pin **b**, rotates the bridge 377 to preset the release of the servomechanism 372 (Chap. XXXIX).

In the extra-cycle performed before the dividend printing cycle controlled by the key 393 (Chap. XLIV), the plate 196, by moving backward, rotates the arm 198 in the direction of the arrow. This arm 198, actuates, through its wing **a**, the extension **d** of the rod 368 pushing it down, The wing **a** of the rod 368 gets released from the step **h** of the lever 376 and moves in front of the arm **m** of the bridge 411. Furthermore the wing **n** of the rod is hooked, by going down, by the small hook 410 and remains in this position until the cycle ends.

At the end of this cycle, the servomechanism 372 is released by the hook 374 and pushes forward the rod 368. This rod, through its wing **g**, rotates in the direction of the arrow the bridge 411 which wing **p** actuates the skid-edge **q** of the plate 355 pushing it backward. The plate 355 sets with its finger **c** the cypher stop 27 in the column immediately at the right of the higher column of the divisor (in the fig. 1 at the right of the first column) and also, through its wing **k**, it rotates the movable dog 23, thus releasing the entry slide. This slide moves leftward and, as we shall see at par. *d*), it stops against the wing **c** of the arm 409 preset during the cycle. The divisor entered in the slide is therefore tabulated with the dividend contained in the register. While the slide moves the skid **u** of the plate 355 sets one by one all the cypher stops 27 corresponding to the steps made by the slide during the tabulation.

Toward the end of its forward travel the rod 368 releases its wing **n** from the hook 410 and returns consequently to the high position illustrated in the fig. 1.

If no divisor digit has been entered in the slide, the finger **c** of the plate 355 is in front of the first cypher stop 27. This stop can be set and is supplied with a chamfer **s** in connection with the finger **c**; consequently when the servomechanism 372 is released the plate 355 can move forward all the same and release the slide (see the next page).

c) *Slide antirebounding.*

The slide stopping against the arm 409 (next page) during the automatic tabulation and against the wovable dog 23 (fig. 1) in the other cases, could rebound and stop only after some vibrations. The bridge 413 (fig. 2) which engages constantly its booth **v** between the teeth **f** of the slide, prevents any slide return as weel as any rebounding.

In the second part of the cycle, the cam 142 allows the lever 412 to rotate in the direction of the arrow.

The lever 412, with its extension **z**, rotates now the bridge 413 upward; consequently, the slide is released from the tooth **v** only the part of the cycle in which the slide is restored (Chap. XII). During the remaining of the cycle and with the machine stopped it cannot move rightward.

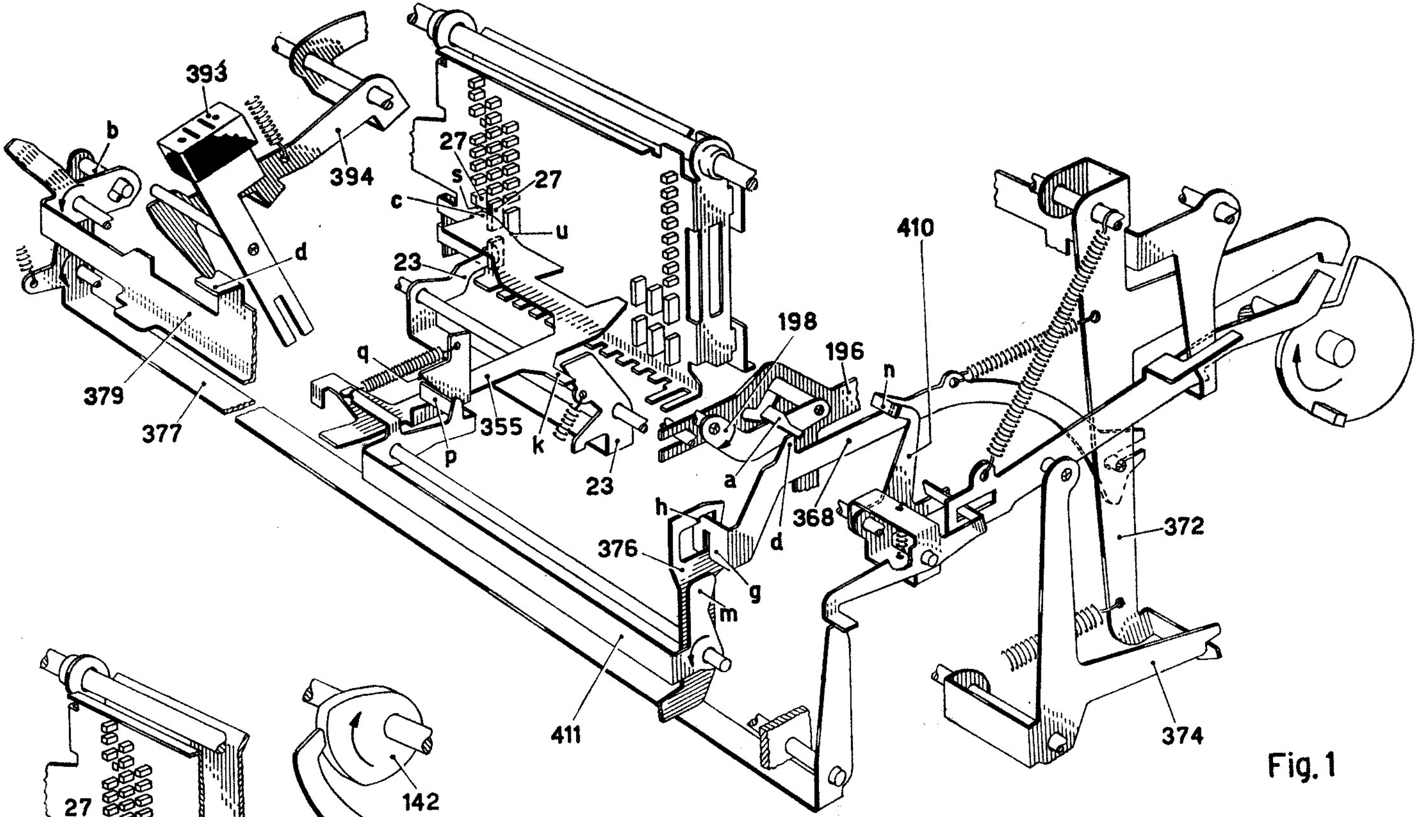

393
b
394
27
s
27
c
u
d
23
379
377
q
355
p
k
23
198
196
n
410
a
d
368
h
376
g
m
411
372
374

Fig. 1

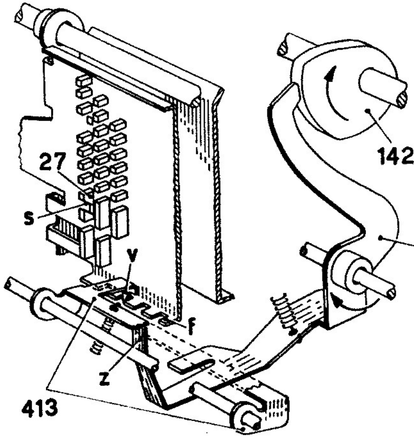
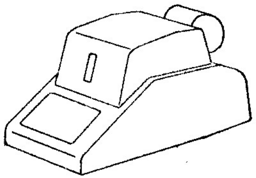

142
27
s
412
v
f
z
413

Fig. 2



XLV - Automatic tabulation.

d) *Slide stopping.*

In the cycle in which the dividend is printed, the key 393 holds the bridge 266 rotated in the position illustrated in the fig. 1, by means of the slider 267. The extension **a** of the slider 272 stops the wing **d** of the lever 414 integral with the lever 395 and prevents therefore that this latter releases the slider 397.

As we have seen at par. *a*), in the cycle in which the dividend is printed, the arm 409 is preset for the tabulation of the slide with the dividend. At the end of the cycle, the main shaft clutch opens again and the key 393 returns to rest together with the slider 267 and the bridge 266 which rotates now in the direction of the arrow. The slider 272, by moving forward, now releases the lever 414 from the extension **a**. Thanks to then spring 415 the lever 414 rotates until the wing **f** of the lever 416 also integral with the lever 414 stops against the end of the arm **g** of the horizontal lever 417.

At the end of the cycle, as explained in the par. *b*), the slide is released and its extension **h** meets with the wing **c** preset by the arm 409. This latter is then dragged for a short transversal run (rightward in the figure) and drags at its turn the pin **p** of the lever 417 which rests constantly against the arm. The lever 417 is therefore rotated in the direction of the arrow until the pin **p** stops together with the arm 409 against the small left side-plate 236 of the machine (position illustrated in the figure 2). In this position the divisor is at last tabulated with the dividend.

XLVI - Division control.

a) *Closing the clutch.*

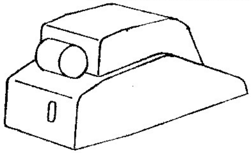
The lever 417, following the rotation in the direction of the arrow explained above, releases from its arm **g** the wing **f** of the lever 416 (fig. 2) which can at last rotate together with the levers 395 and 414 (fig. 1) actuated by the spring 415. The skid **n** of the lever 414 then acts on the pin **i** of the crank 307 and rotates it in the direction of the arrow thus closing the motor circuit and the main shaft clutch (see Chap. XXVIII); consequently the division cycles start automatically.

The lever 395 releases at its turn the wing **q** of the slider 397 which, through its wing **c** and the bridge 341, remains therefore controlled by the main shaft cam 340.

b) *Locking by excess of dividend and lack of divisor.*

If the dividend occupies all the capacity of the register, the arm 409 stops as we know against the wing **m** of the small plate 408. When the slide is released its extension **h** meets with no wing e and it stops at the end of the run without moving transversally the arm 409. The lever 417 is not therefore rotated and the division is not started. The mechanism can be moved to rest by depressing one of the correction keys (Chap. XIV and XV).

If the dividend contained in the register is negative, the adding wheels at the left of the higher dividend digit are at nine. The arm 409 is then stopped by the small plate



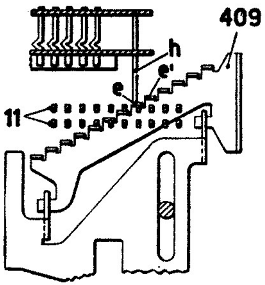


Fig. 3

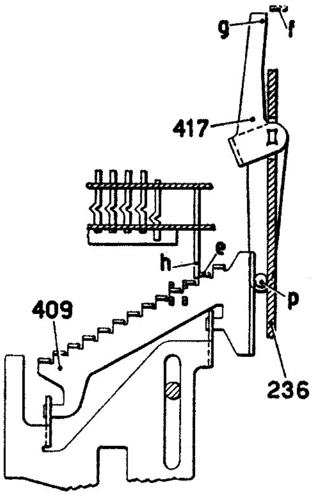

g
f
417
h
e
p
409
236

Fig. 2

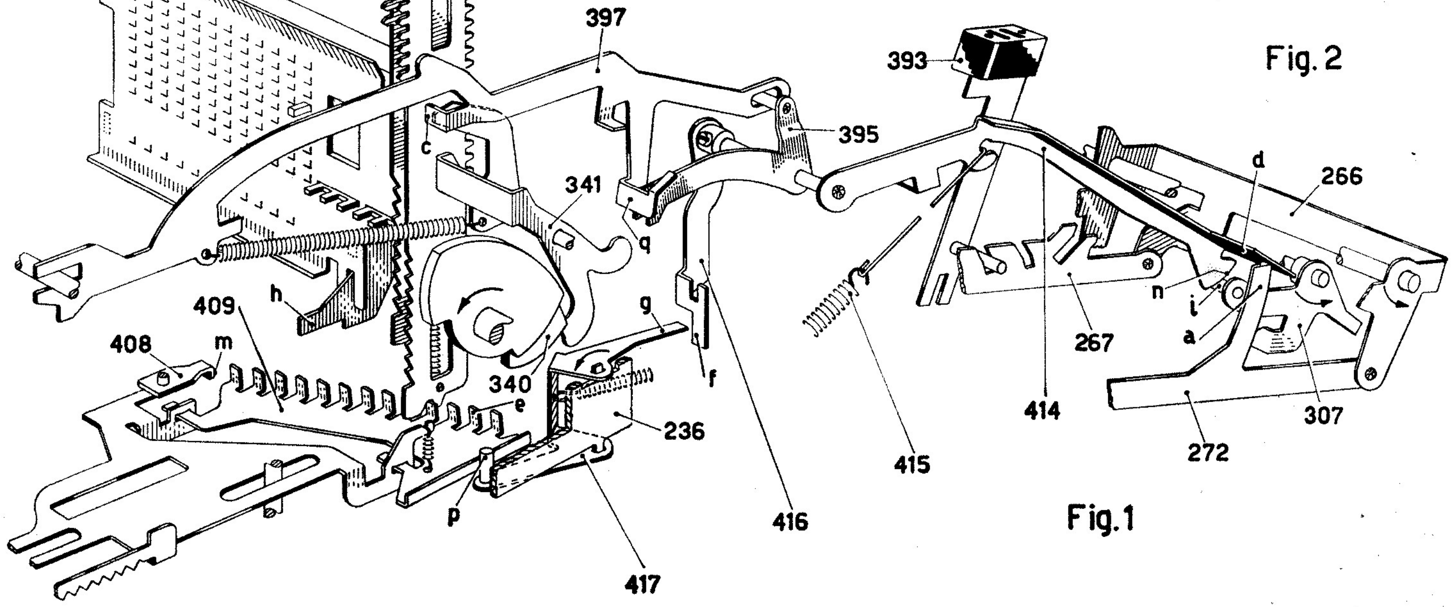

11
397
393
395
c
341
q
d
266
n
i
a
267
409
h
g
408
m
340
e
f
236
414
307
p
416
415
272
417

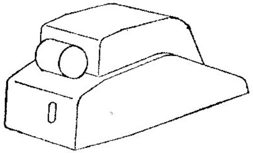
Fig.1

408; consequently if the dividend is negative the division is not started (Chap. XLIV).

If no divisor digit has been entered, the arm 409 is not moved forward (Chap. XLV, par. *a*) and the slide stops at the end of the run without meeting with the arm 409. In this case also the division is not started.

c) *Locking by excess of divisor.*

If the divisor has a number of digits greater than that of the dividend, during the presetting of the tabulation, the arm 409 goes stopping frontally with a wing **e** against the extension **h** of the slide without being able to test the executer 11 of the higher dividend digit (fig. 3). When the slide is afterward released it stops immediately against the adjacent wing **e'**, thus starting regularly the division. In this case, after the subtraction cycle in which the surpassing and the adding cycle take place, the machine stops (Chap. L).



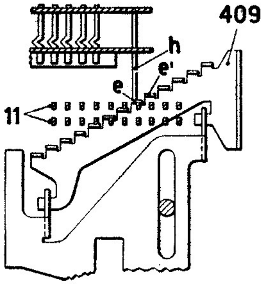


Fig. 3

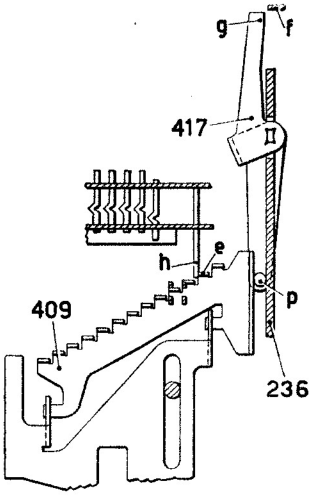

g
f
417
e
h
p
409
236

Fig. 2

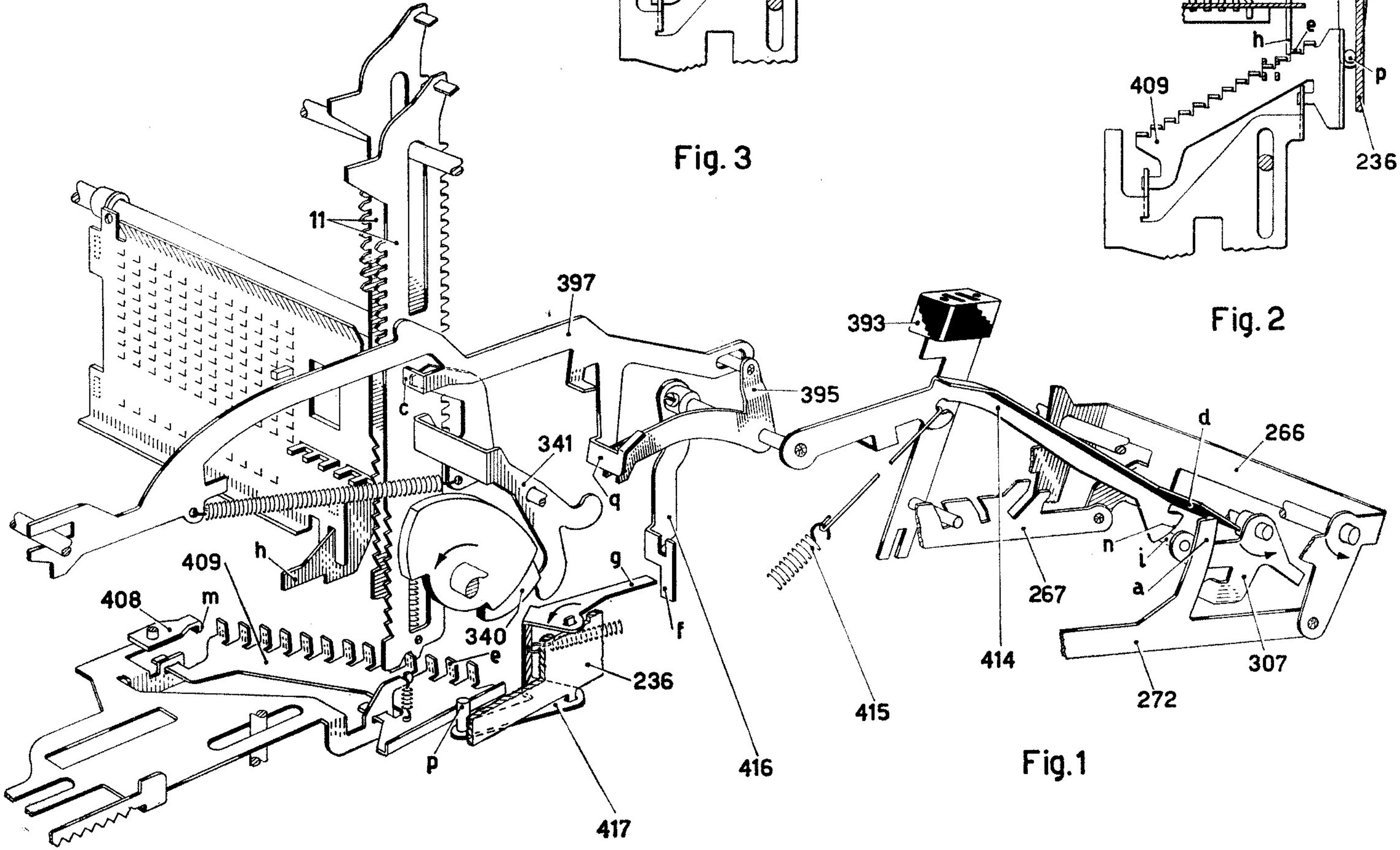
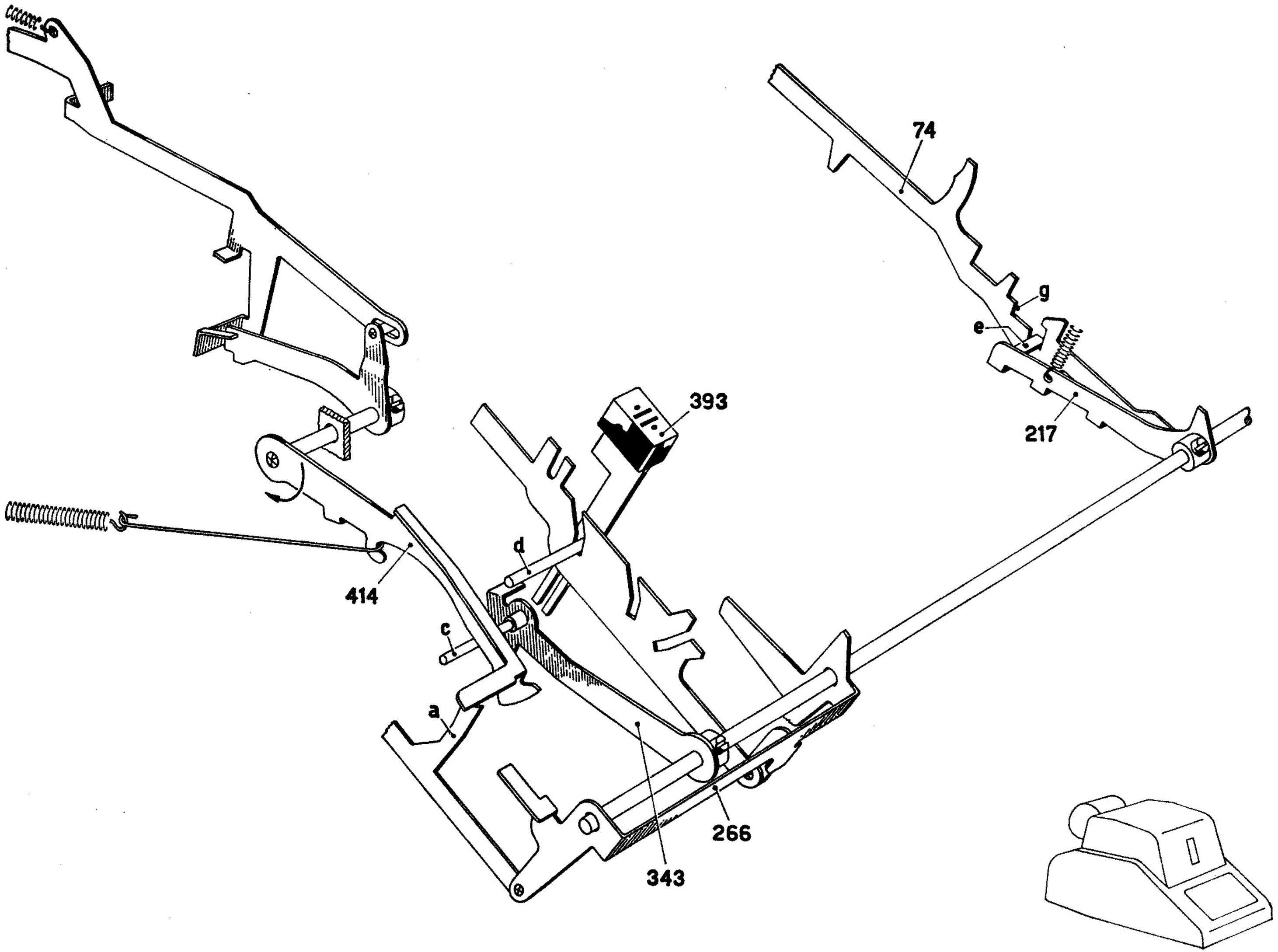

11
397
393
395
c
341
q
409
h
408
m
g
340
e
f
236
p
417
416
415
414
267
266
d
n
i
a
307
272

Fig. 1

d) *Register engagement control.*

We have seen (Chap. XLIV) that in the dividend printing cycle the second register engagement is controlled by the lever 217 which is held in sub-total position as illustrated in the figure by the key 393 by means of the pin **d** and the arm 343. When at the end of the cycle, the key 393 returns to rest, the arm 343 moves for a moment to the high position.

At the end of the slide tabulation, the lever 414 rotates in the direction of the arrow (par. *a*) and drags the pin **c** of the arm 343 in such a way to move the wing **e** of the lever 217 on the trajectory of the step **g** of the slider 74 which presets the engagement of the second register for calculation in all the division cycles.


74
g
e
393
217
d
414
c
a
343
266

XLVI - Division control.

c) *Exclusion of the circular transmission.*

With the method of repeated subtractions (Chap. XLII) for every digit of the quotient, the machine must perform first of all a number of subtracting cycles equal to the value of quotient digit plus one and then an adding cycle. As we shall see at Chap. XLVII the reverse from subtracting to adding cycles and vice versa is established by the second register balance indicator.

During the division, while the balance indicator is employed as said above, the circular transmission mechanism must be excluded because when the quotient is exact and therefore the remainder is zero, the circular transmission should make a wrong division. Suppose we are performing the division:

$$400 : 2 = 200.$$

If we had a circular transmission the operation should be perform as follows:

Cycle	Wheels A	Wheels S
	...0400	...9599
1st subtraction		200
	...200	...9799
2nd subtraction		200
	0000	9999
3rd subtraction		200
	...0799	...0200
Addition	200	
Remainder	...9999	...0000

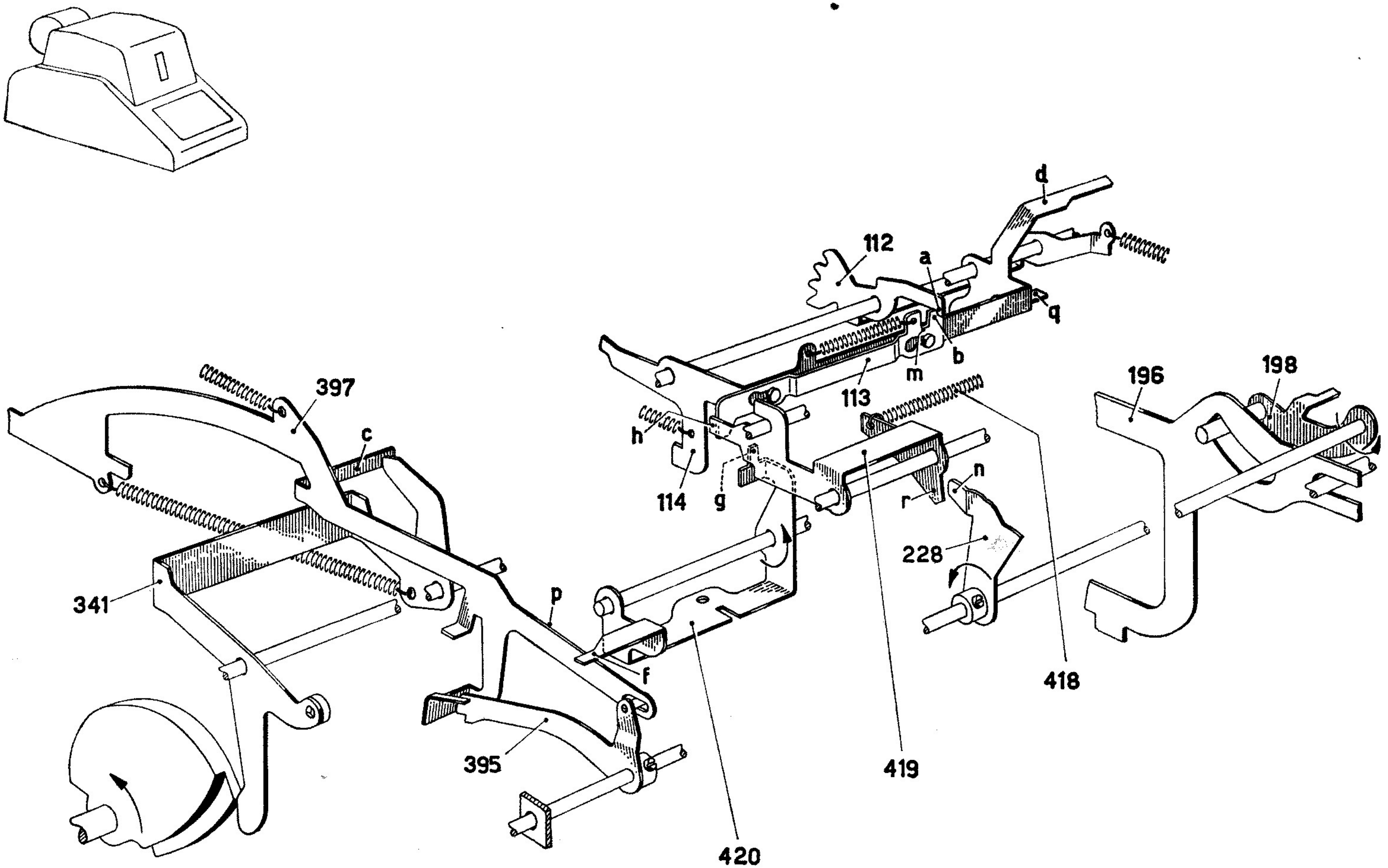
The remainder ...9999 is therefore wrong.

If we now move the slide by one step and we start again the operation for the second digit of the quotient which should be a zero, the machine should make as many subtraction cycles to surpass the value ...9999 of the register; the quotient would be also wrong.

To exclude the circular transmission, the second register transmission bridge is divided in two parts 114 and 112. The part 114 with the wings **d**, **q** controls the balance indicator (Chap. VIII), the part 112 controls the entry of the transmission unit in the right wheel. Both parts are normally connected to the small plate 113 which extension **b** is under the arm **a** of the part 112.

After the tabulation of the divisor with the dividend and the starting of the division (Chap. XLV, par. *e*), the lever 395 releases the slider 397 which trips forward and goes resting with the wing **c** against the bridge 341. In this movement the upper bent profile **p** of the slider 397 raises the wing **f** of the bridge 420. This latter rotates in the direction of the arrow and releases from the extension **g** the bridge 419 which thanks to the spring 418 trips rightward. The bridge 419, by means of its extension **h**, drags now toward the right the small plate 113 which spring is weaker than the spring 418. The small plate 113 thus carries the opening **m** on the trajectory of the arm **a** uncoupling the two parts 114 and 112 and excluding in this way the circular transmission.

The circular transmission will be restored after the end of the division, in the quotient printing cycle (Chap. LII). In fact, since in this cycle there is the extra-cycle (Chap. XVI) the plate 196, by moving backward, rotates in the direction of the arrow the arm 198 together with the arm 228 to which it is integral with. The bent wing **n** of the arm 228 then actuates the extension **r** of the bridge 419 pushing this latter leftward so that to move it back to the position illustrated in the figure and to re-hook it to the extension **g** of the bridge 420. The small plate 113 can now move back leftward and couple again the two parts 114 and 112 of the circular transmission bridge.


d
112
a
q
b
m
113
397
c
h
114
g
196
198
n
r
228
418
341
p
f
420
419
395

XLVII - Operating sense control.

a) *Register inversion anchor control.*

We have seen at Chap. XLV, par. *c*) that after the division has been started, the slider 397 is controlled by the cam 340 through the bridge 341 and it can move forward at every cycle actuated by the spring 396. At the beginning of the division and until the dividend is greater than zero, the balance indicator 121 is in the normal position illustrated in the figure. The bridge 423 which, with the wing **b**, rests normally against the arm **c** of the indicator 121 holds then its arm **d** under the trajectory of the wing **e** of the slider 397.

At the beginning of every cycle the cam 340 allows the bridge 341 rotating in the direction of the arrow. The slider 397 moves forward and, with its skid-edge **g** acts every time on the edge **h** of the arm 336 which, through the arm 104 carries the anchor 103 in high position to preset the second register inversion in subtraction (Chap. VII). Every cycle is therefore a subtracting cycle in which the divisor is subtracted from the dividend.

When in one of these cycles the capacity of the dividend is surpassed, that is when the number contained in the register is less than zero, the indicator 121 is rotated in the direction of the arrow. The arm **c** rotates therefore the bridge 423 to bring its arm **d** on the trajectory of the wing **e** of the slider 397.

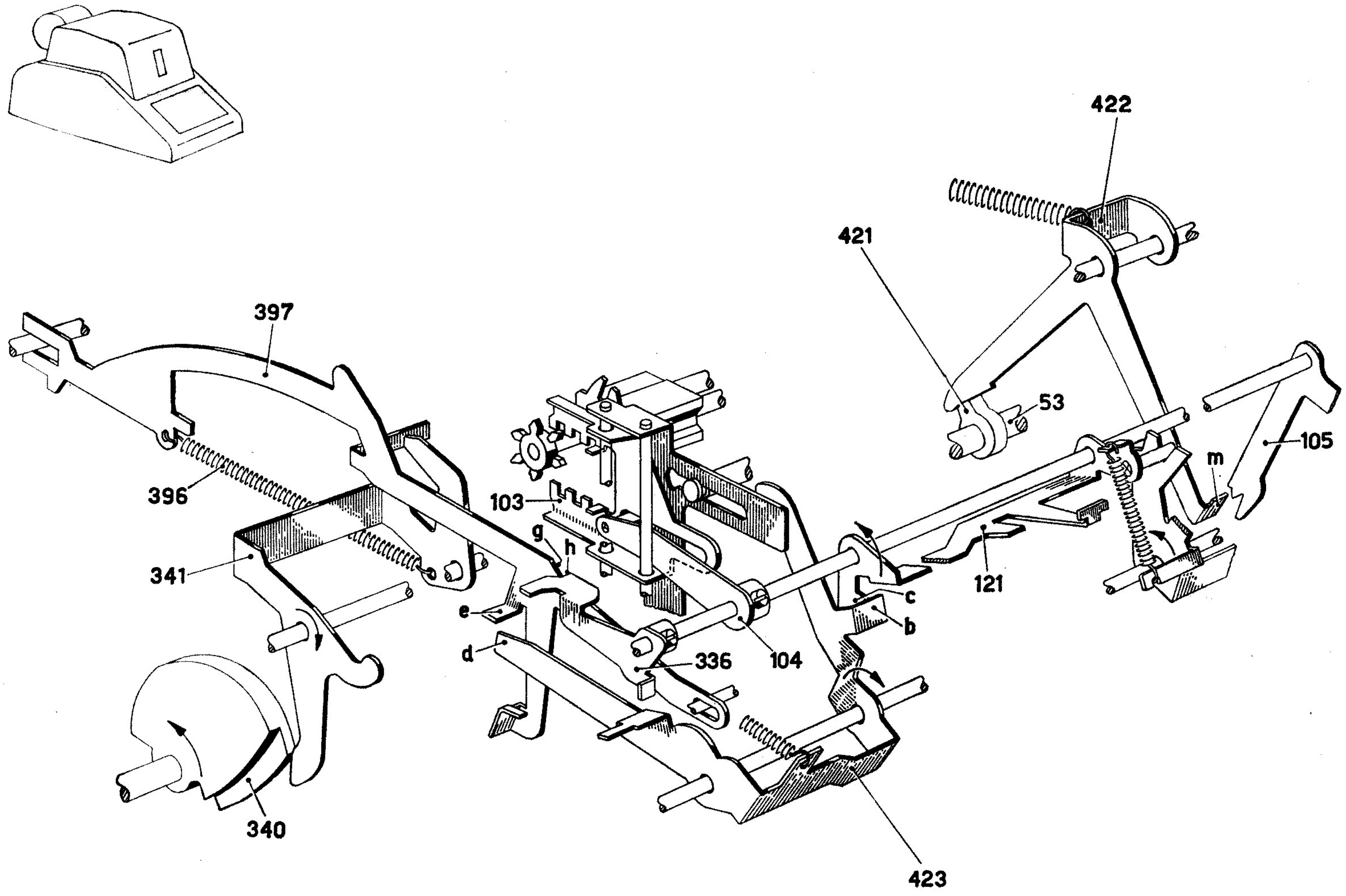
In the cycle following the surpassing, the slider 397 is stopped while moving forward by the arm **d** of the bridge 423 and doesn-t rotate the arm 336. The anchor 103 remains in low position and presets therefore the register for addition.

In this adding cycle is performed the re-adding of the divisor in the register which passes again through the position zero; consequently, the indicator 121 returns to the position illustrated in the figure together with the bridge 423. In the next cycle the slider 397 is therefore free to move forward and to start again a new series of subtracting cycles.

b) *Locating and locking the inversion anchor.*

The control of the anchor 103 either by the slider 397 during the division than by the small plate 335 during the subtraction (Chap. XXXIII) is always performed through the spring 396 controlled by the cam 340 which moves back the bridge 341 to rest position at 220° about of the cycle.

The locating of the anchor 103 is completed and the anchor is locked in the position reached by the stabilizer 422. This latter, actuated by its own spring controlled by the cam 421 of the main shaft 53, acts with its wing **m** on the toothed end of the lever 105 integral with the arm 104 and holds therefore the anchor 103 in the position reached until the cycle ends.


m
g
h
c
b
e
d

XLVIII - Formation of the quotient.

We have seen at Chap. XLIII that by depressing the division key the small slide 389 engages the wing **g** between the teeth of the bridge 291 which has moved leftward during the entry of the divisor (in the fig. 1: one step).

We have also seen at Chap. XLIV that in the dividend printing cycle, the divisor entered in the slide is tabulated with the dividend contained in the register. In this tabulation the bridge 291 moves further to the left together with the small slide 389 by a number of steps equal to the difference between the dividend digits and those of the divisor. This difference increased by one unit represents the number of digits of the quotient of which the first one can be a zero which is not printed. While the bridge 291 moves, the wing **b** of the small slide 389 which is placed normally behind the rack 250 of the units move in connection with the rack 250 on which should be formed the first digit of the quotient. If for instance we have to divide 248 by 2, the small slide 389 moves by $3-1=2$ steps leftward, the wing **b** moves in connection with the rack 250 of the hundreds and the quotient 124 will have three digits. If, on the contrary, we have to divide 248 by 4, the wing **b** moves still in connection with the rack 250 of the hundreds but the first digit of the quotient thus calculated will be a 0 and will not be printed; the quotient 62 has two digits only.

As we have already seen, at every subtracting cycle, the slider 397 controlled by the cam 340 moves forward allowing the arms 385 to rotate further in the direction of the arrow; consequently, the small slide 389 is moved forward. Besides, at 120° of the cycle the cam 346, through the small plate 347 and the stay 424, drags downward the arm 390 and therefore the small slide 389. Through the combination of the two movements of the small slide 389 its wing **b** engages at every cycle one of the teeth **a** and moves the rack 250 which is in front one step downward thus accumulating the calculation unit.

In the first subtracting cycle, when the slider 397 moves forward, the small slide 389 cannot follow it because the wing **c** of the arm 398 stops immediately against the lower profile of the lever 425 which goes resting on the wing **d** of the lever 362. Consequently, when at 120° the small slide 389 moves downward, the wing **b** has not engaged the tooth **a**. The cycle is not counted and we eliminate in this way the subtracting cycle more. At 160° of the cycle, the cam 363 allows the lever 362 to rotate in the direction of the arrow and releases the lever 425 from the wing **d**. The wing **c** of the arm 398, actuated by the spring 426, rotates the lever 425 in the direction of the arrow. At the end of the cycle, the lever 425 remains hooked under the wing **d** of the lever 362, as in the figure 2.

In the following subtracting cycles, the wing **c** of the arm 398 is no more stopped by the lever 425 and the small slide 389 moves first its wing **b** to engage with the teeth **a** and then goes down pushing downward the rack 250. At every cycle the wing **d** of the lever 362 releases temporarily the lever 425 which is anyhow held rotated by the wing **c** of the arm 398 (hachured position in the figure 2).

When the adding cycle takes place, the slider 397 is immediately stopped in its forward travel (Chap. XLVII) and prevents the forward advance of the small slide 389. Here also the wing **b** doesn't engage with the teeth **a** of the rack 250; consequently, the adding cycle also is not counted. Concluding, the rack 250 has moved downward by as many steps as are the subtracting cycles less one; that is it has formed a quotient digit.

Since in the adding cycle the arm 398 doesn't rotate, the lever 425 when released from the wing **d** of the lever 362, can return to rest position (fig. 1). At the end of the cycle the lever 425 remains above the wing **d**; consequently, in the first next cycle it will stop again the wing **c** of the arm 398.

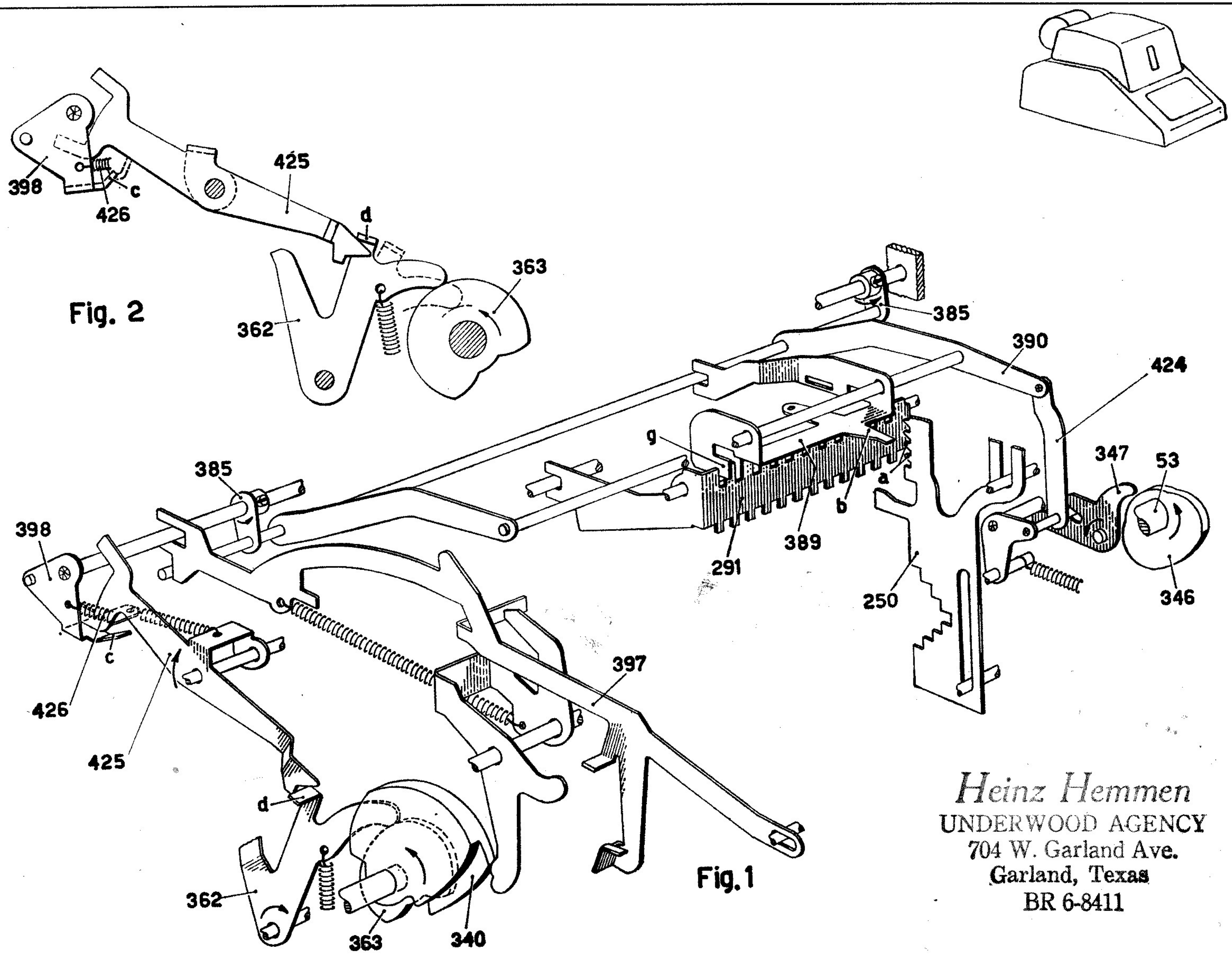


Fig. 2

Fig.1

425
398
c
426
d
363
362
385
390
424
g
347
53
a
b
389
291
250
346
398
385
397
c
426
425
d
362
363
340

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XLIX - Slide back-space.

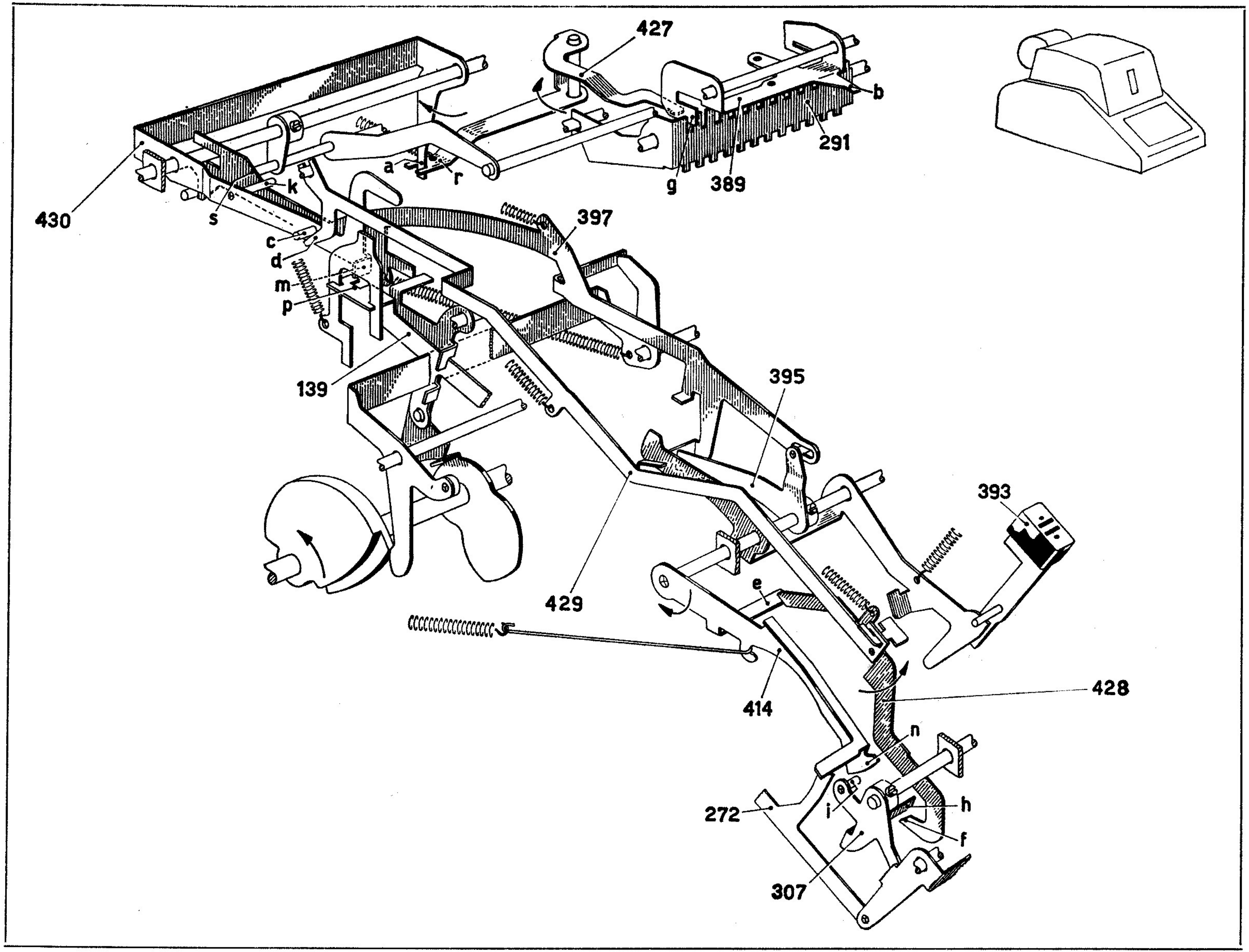
In the figure the mechanism is illustrated in the position it takes after the key 393 has been depressed and before the entry slide has been released for automatic tabulation.

We have seen that at the end of the dividend printing cycle the slide moves for tabulation together with the bridge 291 and the small slide 389. The lever 427 which, at rest, rests against the wing **g** of the small slide, is therefore left and tries rotating in the direction of the arrow. The bridge 430 which arm **a** is engaged with the fork **r** of the lever 427 stops immediately with its pin **c** on the extension **d** of the slider 429.

When at the end of the cycle the key 393 returns to rest and moves the connecting-rod 272 forward (Chap. XLV, par. *e*), the lever 414 can rotate in the direction of the arrow together with the lever 395. The lever 414 releases now from its wing **e** the hook 428 pivoted on the slider 429. The hook 428 by rotating in the direction of the arrow actuated by is own spring, carries its end **f** in front of the wing **h** of the crank 307. By carrying on its run the lever 414 actuates with its skid **n** the pin **i** and rotates the crank 307. This latter closes the motor circuit (Chap. XXVIII) and also, through its wing **h**, drags the hook 428 together with the slider 429 forward. The latter releases from its extension **d** the pin **c** of the bridge 430 which rotates further and goes at last resting with its pin **k** on the upper profile of the slider 397 thus engaging its wing **m** in the slot **p** of the connecting-rod 139.

As we have seen at Chap. XLVII, in every subtracting cycles of the division the slider 397 moves forward. The skid **s** of its upper profile raises every time the pin **k** of the bridge 430 which releases the connecting-rod 139 from its wing **m**. In these cycles the connecting-rod 139 will not be influenced by the bridge 430.

In the adding cycle which follows the surpassing, the slider 397 doesn't move on the contrary forward and the wing **m** of the bridge 430 locks the connecting-rod 139 in such a position to preset the correction of the last digit entered (Chap. XV). Consequently in the last part of the adding cycle the slide is moved back one step rightward together with the small slide 389, consequently its front wing **b** moves in connection with the memory rack immediately at the right.


427
b
291
389
g
a
r
430
s
k
c
d
m
p
397
139
395
393
429
e
428
414
n
h
272
i
f
307

L - Last division cycle.

We have seen (Chap. XXXVII) that at about 180° of the cycle the cam 364 rotates the lever 365 in the direction of the arrow. Normally the arm 431 integral with it then actuates the end **a** of the pawl 432 (fig. 2) pivoted on the slider 397.

When we depress the division key, the slider 397 trips forward together with the pawl 432, while the slider 272 is pushed back with respect to the rest position of fig. 2 (Chap. XLIII, par. *d*). The slider 272 then actuates, by means of its step **k**, the pawl 432 thus carrying its end **a** out of the trajectory of the arm 431. Consequently, in the dividend printing cycle the arm 431 doesn't influence by rotating the pawl 432.

After this cycle, the slider 272 returns to rest and the end **p** of the pawl 432 goes resting against the extension **n** of the bridge 430 which rotates (Chap. XLIX) moving in this way to the position illustrated in the figure 1. The end **a** of the pawl 432 moves therefore again out of the trajectory of the arm 431.

In the division subtracting cycles, as we have seen (Chap. XLIX), the slider 397 moves forward and, by means of the skid **s** rotates the bridge 430 in the direction opposite to that of the arrow, and also moves the pawl 432 forward. This latter, left by the arm **n**, meets with the pin **h** of the small left external side-plate of the machine. The pawl 432 remains therefore rotated with its end **a** out of the trajectory of the arm 431; consequently this latter oscillates voidly. In the adding cycle following every surpassing cycle, the slider 397 doesn't move forward and the bridge 430 remains in the rotated position of figure 1; consequently the pawl 432 is not yet influence by the arm 431.

The last division cycle is the adding cycle performed after a series of subtracting cycle when the small slide 389 has returned to rest position in which its wing **b** is in connection with the memory rack of the units. By returning in this position, the wing **g** of the small slide 389 rotates the lever 427 in the direction opposite to that of the arrow moving it back to the position described in the precedent page together with the bridge 430. The extension **n** of this latter releases the pawl 432 which carries now the end **a** on the trajectory of the arm 431. In the subtracting cycles performed in this position of the small slide, the pawl 432 meets still with the fixed pin **h** and remains therefore unoperative.

In the adding cycle following the surpassing cycle and which is the last division cycle, the pawl 432 remains with the end **a** on the trajectory of the arm 431. At 180° of the cycle, the arm 431 can therefore push it back together with the slider 397. This latter, through the lug **f**, pushes back the small slide 389 and disengage it from the bridge 291. Furthermore, through the lever 395, it rotates the lever 414 in the direction opposite to that of the arrow. The wing **c** of the lever 414 rotates in this way the hook 428 in the direction opposite to that of the arrow, disengaging it from the crank 307. The slider 429, actuated by its own spring, can therefore return back to the rest position illustrated in the precedent page.

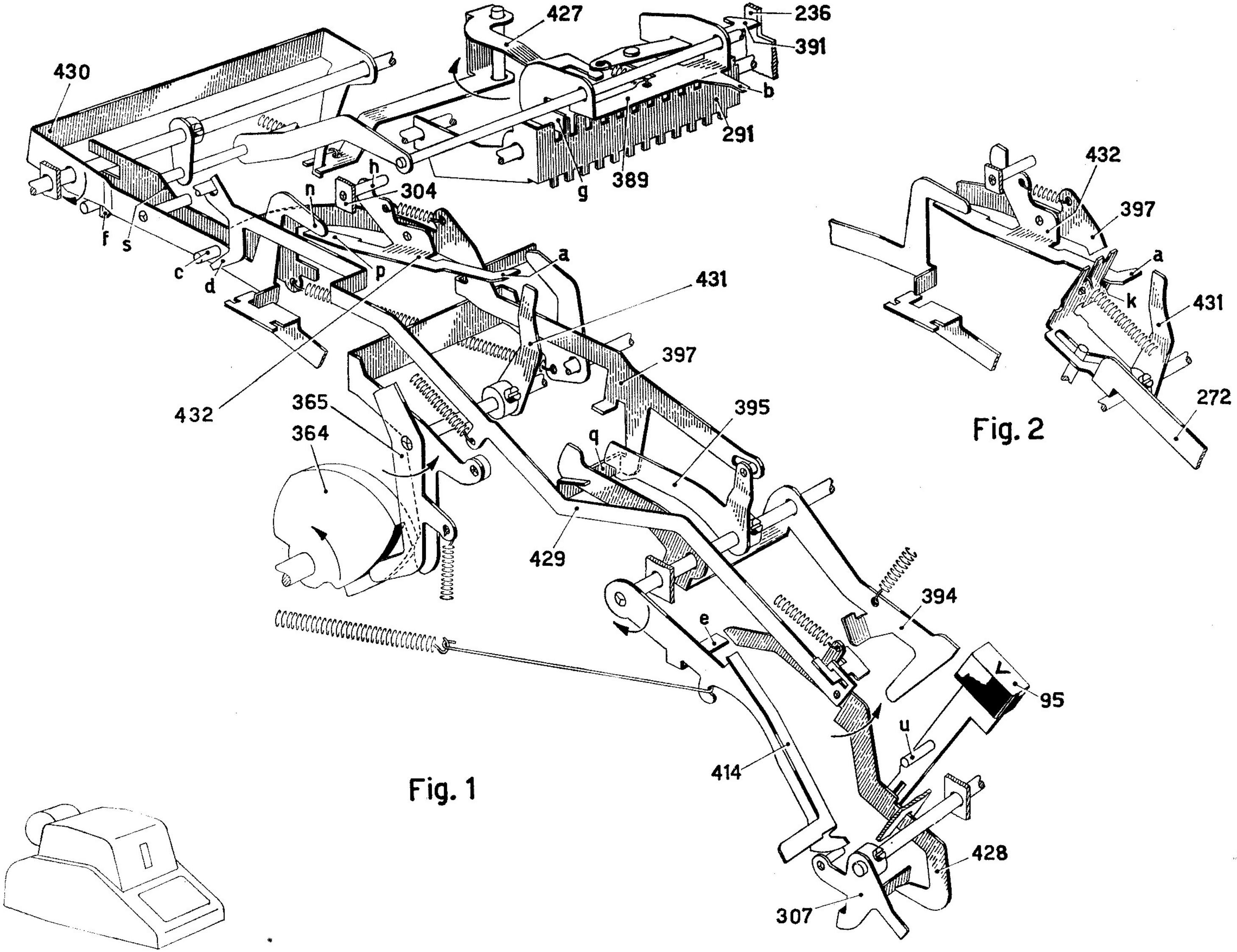

430
427
236
391
b
291
389
g
h
n
304
f
s
c
d
p
a
431
432
397
365
364
395
q
429
394
e
95
u
414
428
307

Fig. 1

a
k

Fig. 2

Then the wing **q** of the slider 397 releases the lever 394 which can at last return to rest thus re-engaging the slider 397 and releasing the repeat mechanism (Chap. XLIII, par. *a*). At the end of the cycle, the entry slide is therefore moved back to rest; consequently the divisor is cleared. Together with the slide the bridge 291 returns also to rest; this bridge pushes the small slide 389 to the right to allow the hook 391 to engage with the small right internal side-plate 236. At last the crank 307 now free from lever 414 returns to rest thus opening the main shaft clutch as well as the motor circuit.

LI - Immediate stopping of the division.

If during the division we depress the non-add key 95 its pin **u** rotates hook 428 in the direction opposite to that of the arrow thus releasing it from the crank 307. The slider 429 can therefore return back actuated by its own spring and, through its skid extension **d**, raises the pin **c** of the bridge 430 and the bridge 423 (page 139) thus creating artificially the conditions of the last division cycle. The division stops therefore before the small slide 389 has returned to rest.

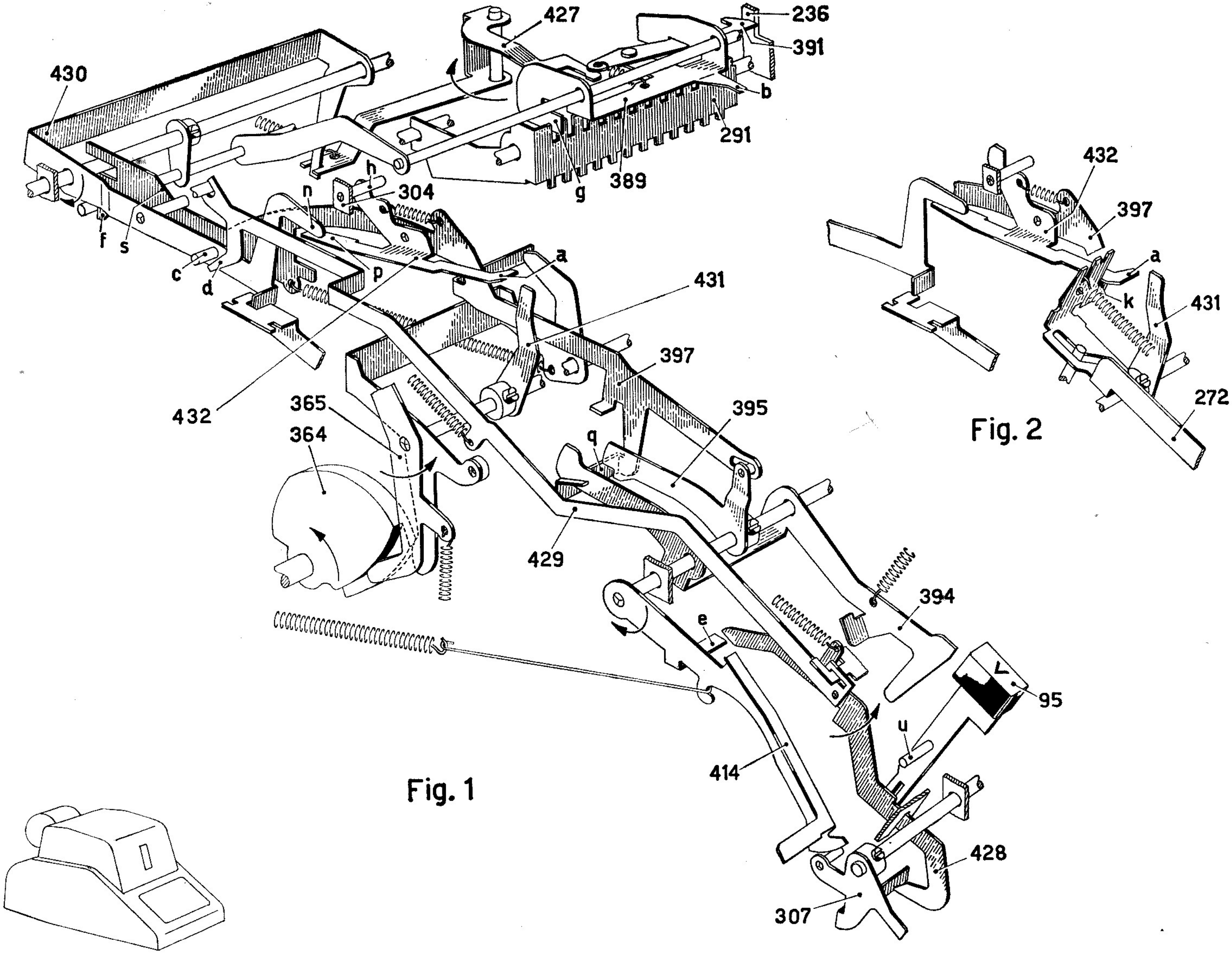

b
g
h
n
f
s
c
d
p
a
q
e
u
a
k

Fig. 1

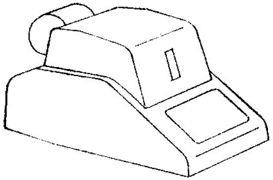
Fig. 2

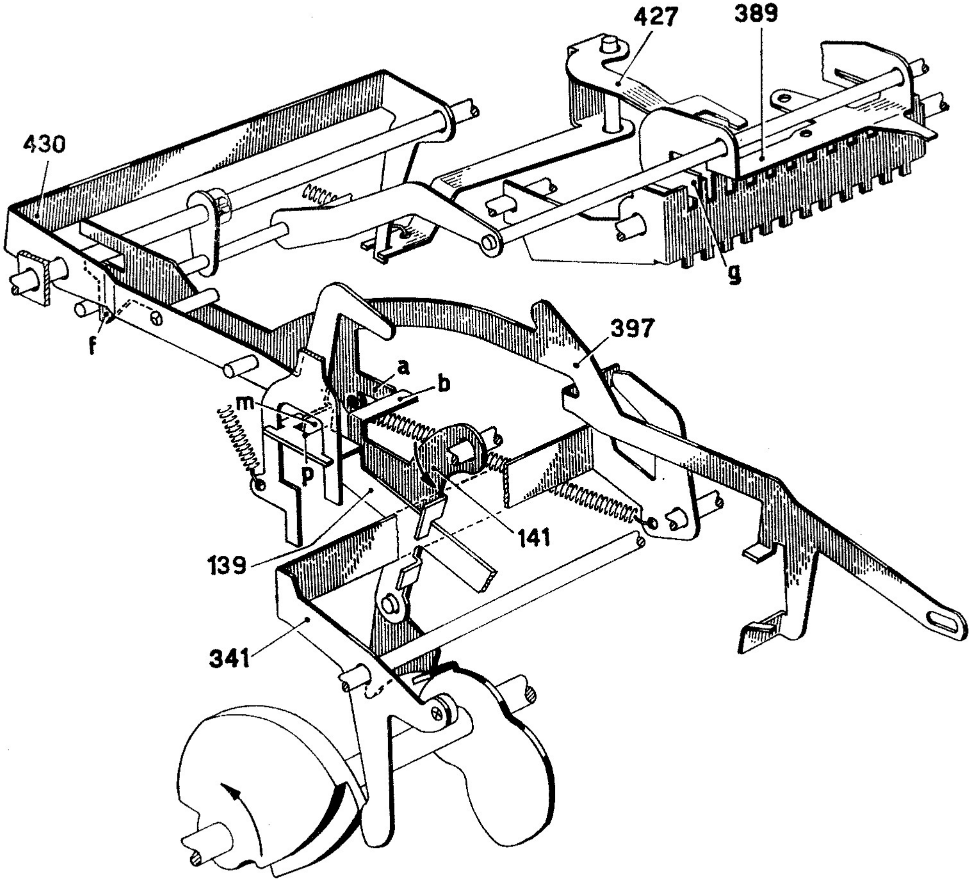
LII - Printing of the divisor.

After the dividend has been printed in the cycle following the depressing of the division key, the printing is prevented until the last division cycle. In fact, in the subtracting cycles of the division, the slider 397, which remains controlled by the bridge 341, moves every cycle forward and puts its extension **a** under the wing **b** of the lever 141 thus preventing it rotating in the direction of the arrow. The connecting-rod 139 doesn't move forward and prevents therefore the printing (Chap. IX). In the adding cycles, as we have seen at Chap. LI, the slider 397 doesn't move forward and the connecting-rod 139 is locked by the wing **m** of the bridge 430 in position of correction of the last digit entered in which the printing is also prevented (Chap. XV).

In connection with the last quotient digit, the small slide 389 has returned to rest and, through the lever 427, has moved the bridge 430 back to rest, disengaging the wing **m** from the slot **p**, while the slide has returned to the position it had after the entry of the divisor and before the tabulation. In the last cycle concerning this figure, that is the last division cycle (an adding cycle), the slider 397 doesn't move forward and doesn't put the extension **a** under the wing **b**. The connecting-rod 139 is not therefore stopped neither by the extension **a** not by the wing **m** and can move to printing position. The figure of the divisor is then printed correctly on the tape.

If the division is stopped by the non-add- key (Chap. LI), in the last cycle made by the machine the printing is performed but the divisor is printed followed by a certain number of zeroes according to the position of the small slide when the key is depressed.




427
389
430
g
f
397
a
b
m
p
141
139
341

LIII - Printing of the quotient.

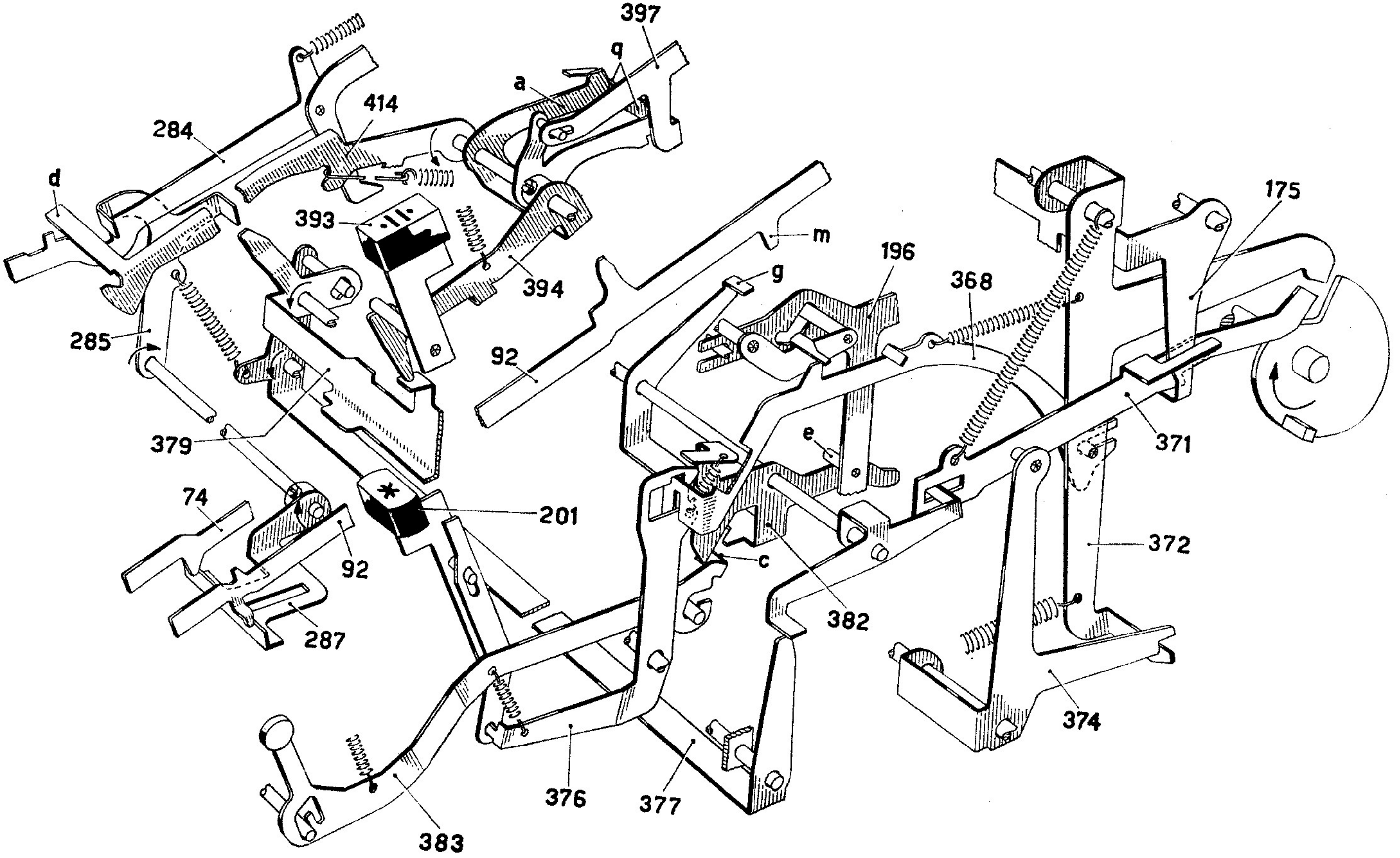
We have seen at Chap. XLV, par. *b*) trat by depressing the division key 393, the bridge 377 presetting the servomechanism 372 release is rotated by means of the lever 394 and the bridge 379. The servomechanism 372 is released a first time to make the automatic tabulation; after, the lever 414 by rotating in the direction of the arrow lowers, through its wing **d**, the hook 284 thus allowing the arm 285 to rotate thanks to its own spring and to engage again the hook 284 in low position. The engagement of the memory is therefore preset (Chap. XXIV) for a memory reading cycle and the backward travel of the two sliders 74 and 92 controlling the registers engagement is locked by means of the arm 287.

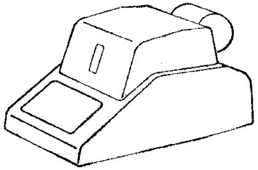
During the division, the bridge 379 is held rotated by the lever 394 which arm **a** has been engaged above the wing **q** of the slider; consequently, the release of the servomechanism 372 remains preset even after the automatic tabulation has been performed.

At the end of the last division cycle, the bridge 175 releases again, through the rod 371 and the hook 374, the servomechanism 372 which through the rod 368 rotates the lever 376 thus depressing the total key 201 (Chap. XXXIX). The motor circuit is therefore closed and the presetting extra-cycle starts (Chap. XVI) followed by a memory reading cycle because of the hook 284 being preset. In fact, since the hook 284 is in low position, the memory racks are engaged in this cycle with the executers (Chap. XXIV); consequently in this cycle the machine prints the quotient which is accumulated into the memory. Yet, the two registers cannot be engaged with the executers in total even if the key 201 has been depressed automatically, since the back travel of the sliders 74 and 92 is still locked by an arm 287.

LIV - Accumulation of the quotients.

By moving forward the accumulation slider 383, the wing **c** is carried out of the trajectory of the bridge 382. When the servomechanism 372 releases the quotient printing cycle, the bridge 382 is released from the lever 376, from the pin **e** of the plate 196 which moves back during the extra-cycle and from the wing **c** of the slider 383. The bridge 382 can therefore rotate putting its wing **g** on the trajectory of the lug **m** of the slider 92. During the quotient printing cycle, the wing **g** stops the slider 92 in adding position and the quotient accumulated in the memory is accumulated in the first register (Chap. XL).


q
a
d
m
g
e
c



LV - Printing of the remainder.

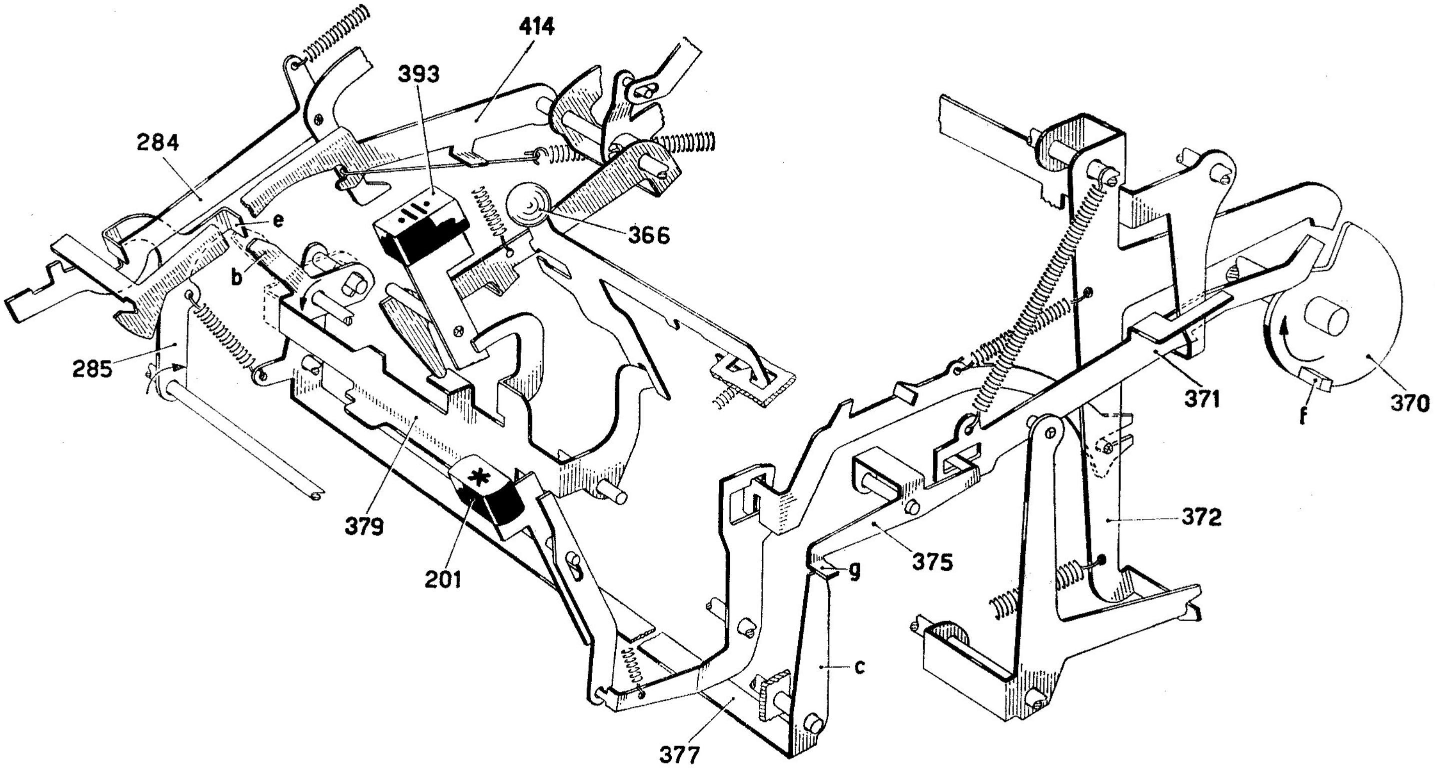
The remainder is printed on the tape at the end of the division by a second register total key. The total cycle can be performed automatically also after the printing of the quotient when the automatic button 366 has been precedently moved leftward. This button moves at its turn leftward the bridge 379 which carries its extension **b** in connection with the wing **e** of the arm 285 in the hachured position illustrated in the figure.

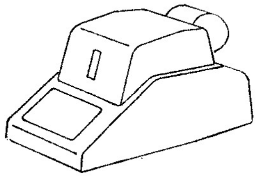
By depressing the key 393, the bridge 379 is rotated in the direction of the arrow. When the lever 414 operates the starting of the division and lowers the hook 284 (Chap. LIII), the arm 285 rotates in the direction of the arrow thus locking the hook 284 in low position. Furthermore, the arm 285 puts its wing **e** behind the extension **b** of the bridge 379 which remains therefore locked in rotated position together with the bridge 377.

In the quotient printing cycle, the hook 284 moves first back returning to high position and then forward bringing back to rest the arm 285 at about 300° of the cycle (Chap. XXIV). In the first 70° of this cycle, the pin **f** of the cam 370 actuates the rod 371 and releases temporarily the arm **c** of the bridge 377 from the wing **g** of the lever 375 which is behind the arm **c**. The bridge 377 is anyhow still locked by the wing **e** of the arm 285 and at the end of this cycle it remains preset for a further release of the servomechanism 372.

Therefore when the clutch opens again, the servomechanism 372 depresses again the total key 201 which controls a total cycle in the second register; the remainder is therefore printed on the tape and cleared from the register.

Naturally when the remainder is cleared automatically, the accumulation of the quotients cannot be done in the same time. In fact, if besides the automatic button 366, we also actuate the accumulation button, the quotient and then the remainder will be accumulated in the first register.


414
393
284
e
366
b
285
379
201
371
370
f
372
375
g
c
377
*



LVI - Lockings.

a) *Locking of the machine starting during the entry.*

We have seen at Chap. II that by depressing a numeral key the corresponding stem moves backward the universal frame 33 which sets and escapement stop 24. In this displacement the frame 33 rotates in the direction of the arrow the lever 433 which puts its step **a** on the trajectory of the lug **b** of the rocker 435 preventing it rotating. The slider 78 (clutch release) which rests with its extension **c** on the wing **d** of the rocker 435 cannot therefore be pushed forward; consequently, all the keys actuating the slider 78 are locked; that is all the motor keys.

b) *Locking of the machine starting during the slide travel.*

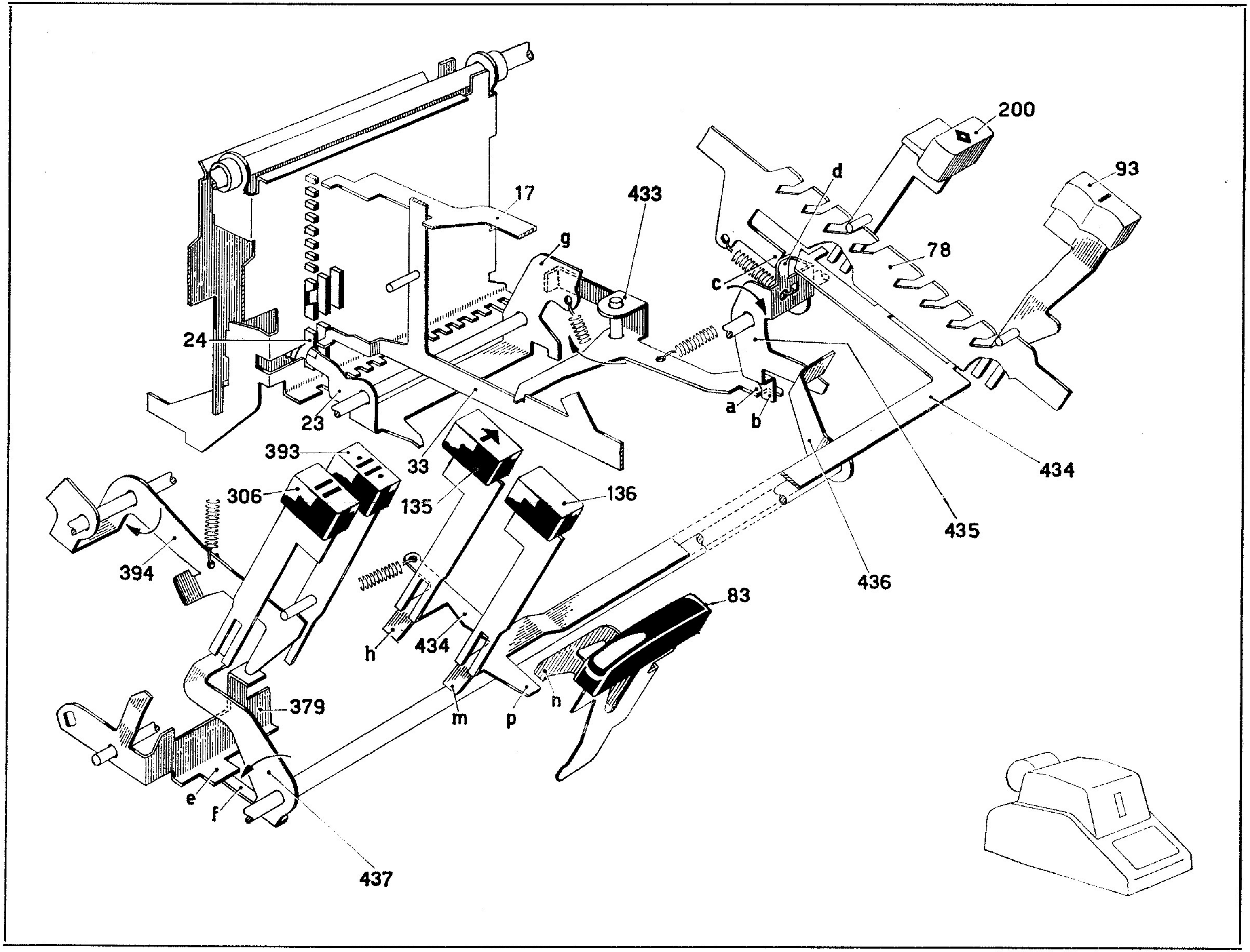
When the escapement movable dog 23 is free from the stops 24, thanks to its own spring, it moves a little rightward and, through its arm **g**, it rotates the lever 433 in the direction of the arrow, as in the precedent case. The rocker 435 is thus locked during all the travel of the slide even when the numeral key has been left and the frame 33 has returned to rest as it should happen when setting the « 00 » or « 000 ». This can take place even in case of automatic tabulation in which the slide should make a long travel with the motor still.

c) *Locking of the numeral keyboard when the machine is at work.*

When the machine is at work the slider 78 is moved forward with respect to the position illustrated in the figure and, through its extension **c**, holds the rocker 435 rotated in the direction of the arrow. The lug **b** of this latter prevents the lever 433 rotating and locks therefore, through the frame 33, all the numeral keys.

d) *Locking of the numeral keyboard during multiplication.*

When we depress the multiplication key 306, the arm 437 rotates in the direction of the arrow. The arm 436 integral with the arm 437 then rotates the rocker 435 thus locking the numeral keyboard independently of the slider 78. This is very important in case, for lack of multicand or because the product exceeds the capacity of the machine, the multiplication should not start after the depressing of the key 306 (Chap. XXVIII).


d
g
c
a
b
h
m
p
n
e
f

e) *Locking of the numeral keyboard durin the division and during the servomechanism release.*

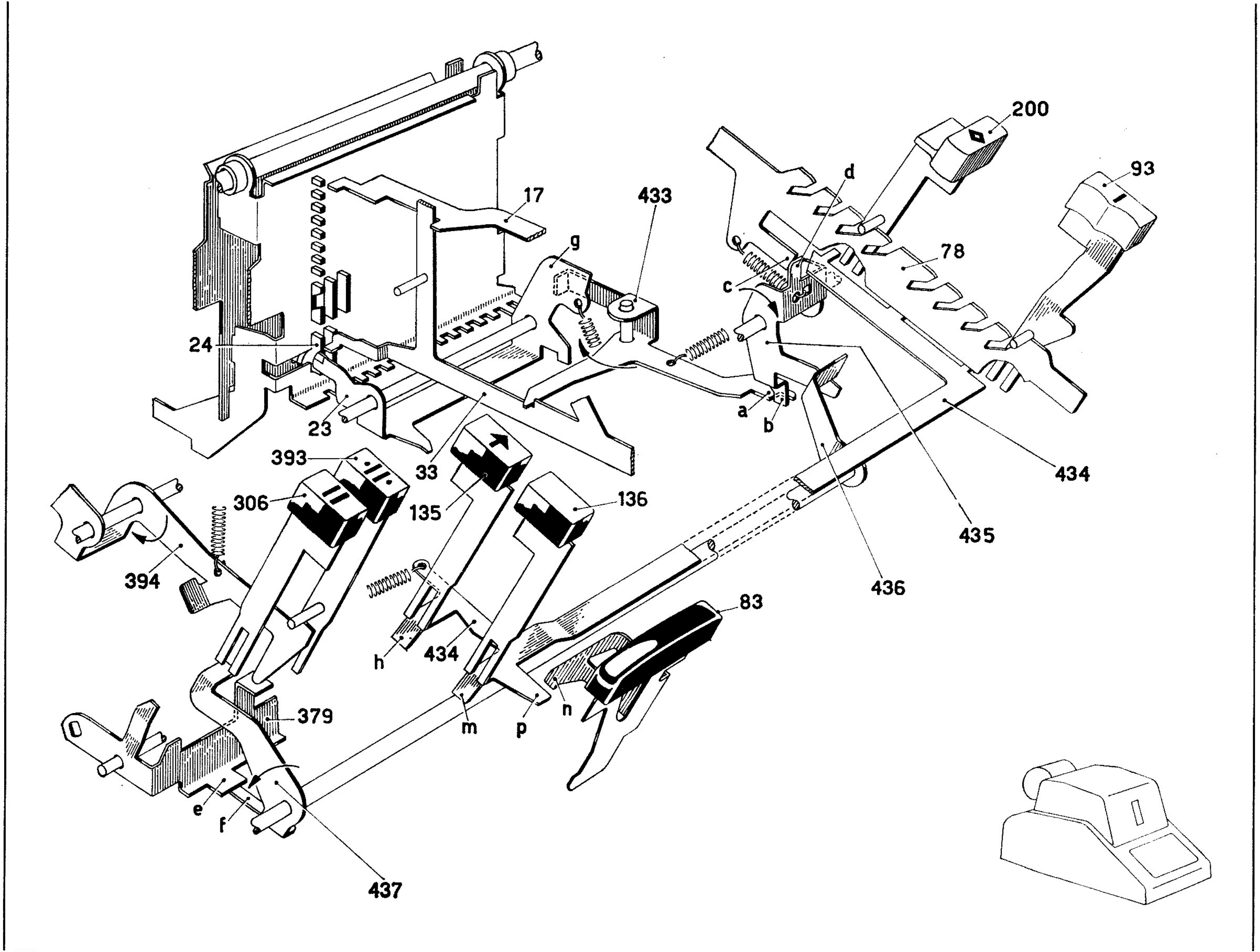
As we know, when depressing the division key 393, the lever 394 rotates in the direction of the arrow and remains rotated during all the division. The lever 394 rotates the bridge 379 which actuates with the wing **e**, the wing **f** of the arm 437 and rotates this latter as in the precedent case. The numeral keyboard remains therefore locked even when the slider 78 returns to rest, as for instance during the tabulation. Furthermore, the numeral keyboard remains locked in case the dividend occupies all the register orders and the slide should not start the division.

At last, since either at the end of the multiplication and before the printing of the product than at the end of the division before the printing of the quotient and when there is, of the remainder, the bridge 379 remains rotated to preset the servomechanism release, the numeral keyboard remains every time locked in the interval between the machine stops and the next starting.

f) *Reciprocal locking correction keys-register keys.*

The locking plate 434 is used to prevent that one of the correction keys might be depressed at the same time with a register control key: that is adding, subtracting and total keys.

By depressing one of the correction keys 135 or 136, the proper stem actuates the bent wing **h**, **m** pushing the plate 434 rightward and carrying it under the stems of the keys 93, 200 and of the other register keys. The front adding key 83 has an extension **n** which is locked by the extension **p** of the plate 434 and is therefore in the same conditions of the other register keys. Reciprocally, by depressing one of these keys the plate 434 is locked in the position illustrated in the figure; the extensions **h**, **m** of this plate prevent the keys 135 and 136 from being depressed.


d
g
c
a
b
h
m
p
n
e
f

Assembly and adjustments

THIS PUBLICATION IS UP-TO DATE TO SERIAL NUMBER

68.000 for TETRACTYS **328.000 for DIVISUMMA 24**

Throughout the following description the terms RIGHT and LEFT are intended when looking at the machine with the keyboard facing the operator.

FRONT: toward the keyboard.

BACK (or REAR): toward the platen and paper-tape roll.

1 - FIGURE 1

Assembling the left internal side-plate.

a) Place the base 44 1 301 A on the proper support and secure it by tightening right home the two screws **V**.

b) In the proper hole of the base place the spring-holder pin 943 1 21 L. Hook to it the spring 40 2 114 Q.

c) Assemble in the hole of the base by means of the stud-screw 926 3 91 J, the multiplication signs control transmission lever 44 5 099 X.

d) Fit on the base the left internal side-plate 44 1 603 H securing it:

— at the front: by means of the screw 43 1 059 Y and nut 938 5 05 Z

— at the rear: by means of the special pin-screw 44 5 056 T (visible in the figure 2 also) and nut 938 5 06 S.

e) Assemble on the left internal side-plate the register guide and stop block 44 3 355 H (upper) by means of two screws 920 3 07 C. The screw should not be set right home and the lower one should be in the middle of its slot.

Make a similar assembly on the hole **A** and on the slot **B** of the same side-plate.

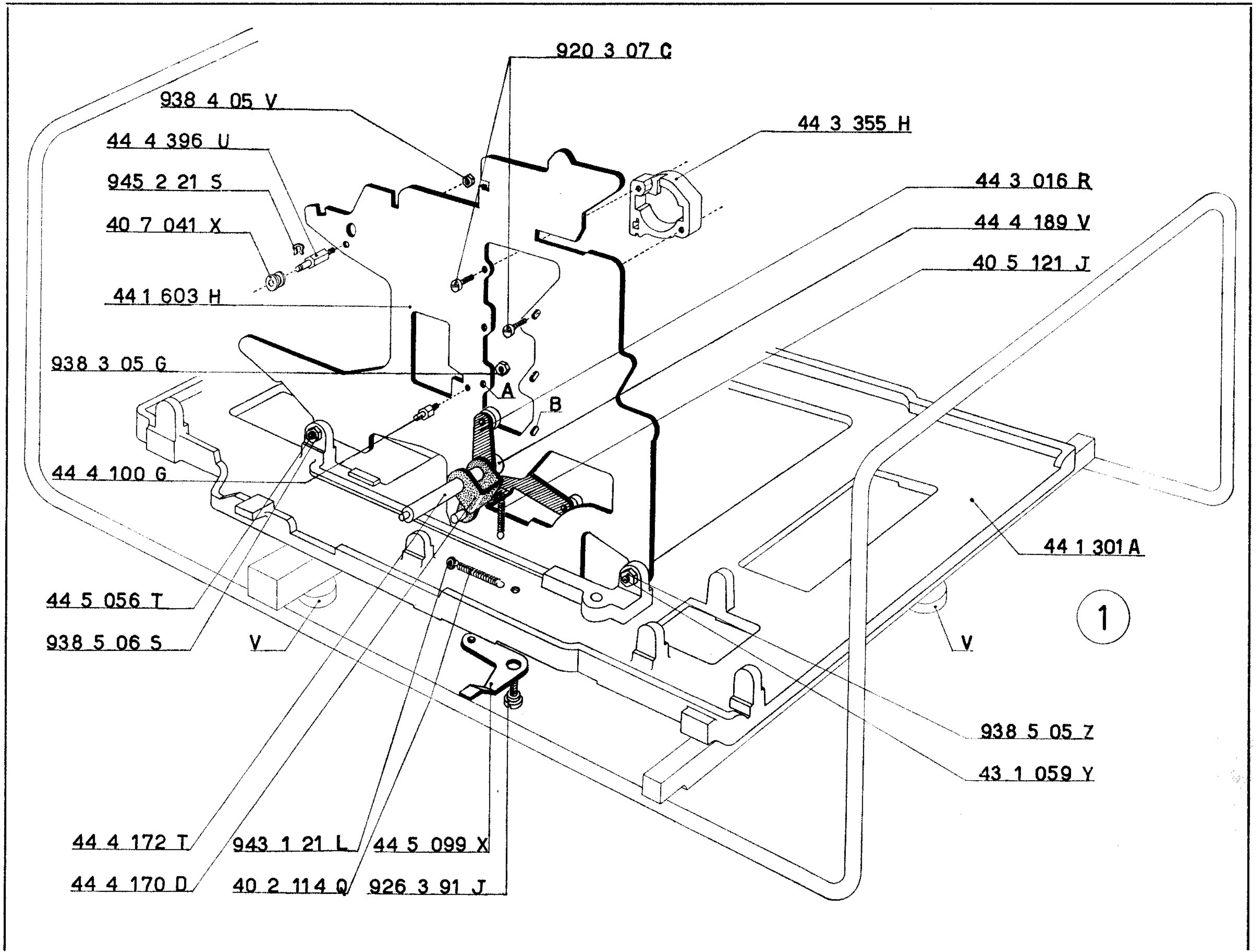
f) Secure on the left internal side-plate:

— the register plate support pivot 44 4 100 G by means of the nut 938 3 05 G

— the support column for the register inversion control plate 44 4 396 U by means of the nut 938 4 05 V. On the column place the roller 40 7 041 X which should be stopped by a spring clip 945 2 21 S.

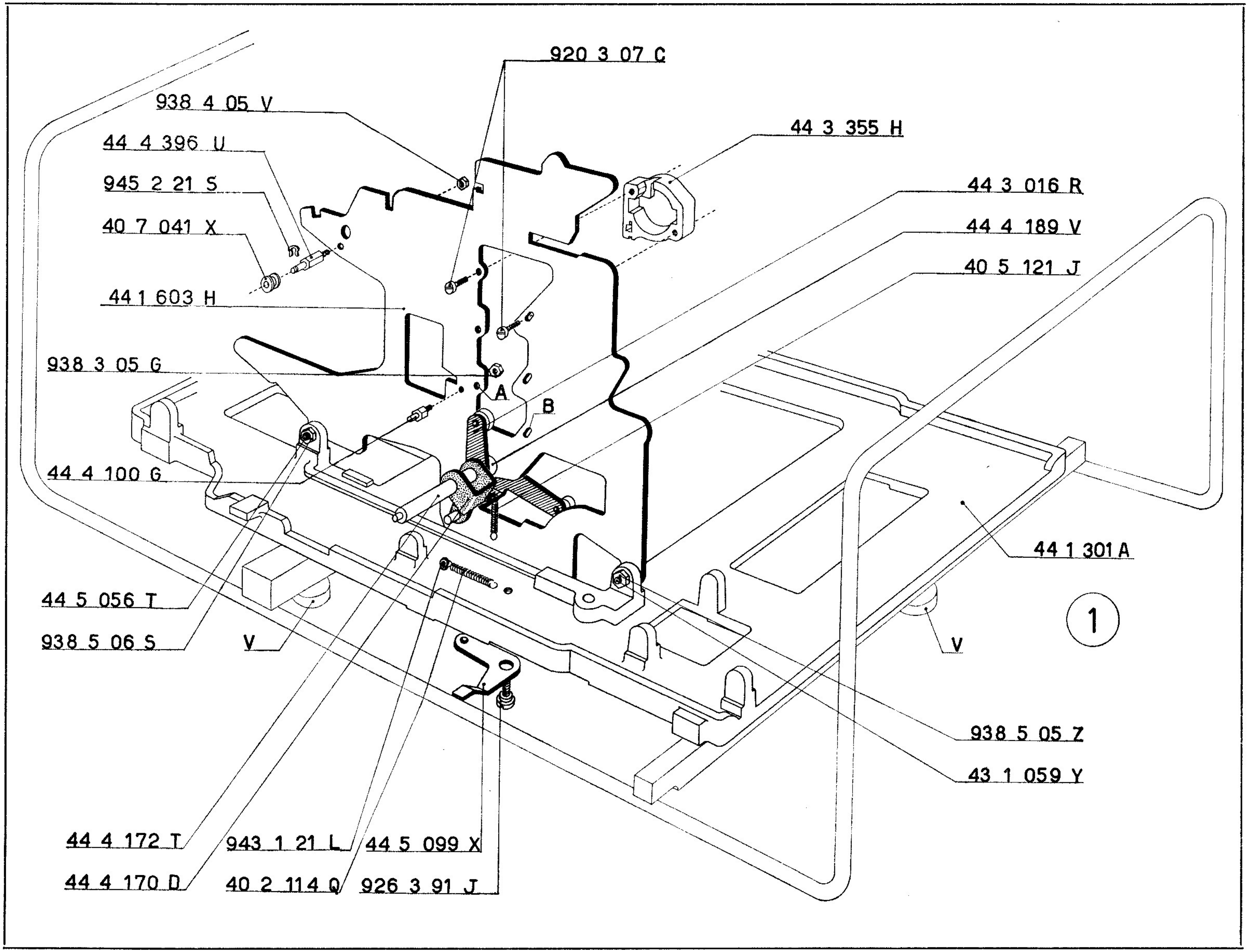
g) Place on the shaft 44 4 172 T the main connecting-rod lower crank 44 4 172 T and the aligning and shifting control crank 44 3 016 R with its ring 44 4 189 V. This unit should be assembled on the left side-plate; the shaft 44 4 172 T is secured by means of a nut 938 5 06 S (see the figure 2).

Hook the spring 40 5 121 J to the crank 44 3 016 R.


920 3 07 C
938 4 05 V
44 3 355 H
44 4 396 U
945 2 21 S
44 3 016 R
40 7 041 X
44 4 189 V
40 5 121 J
44 1 603 H
938 3 05 G
A
B
44 4 100 G
44 1 301 A
44 5 056 T
938 5 06 S
V
V
①
938 5 05 Z
43 1 059 Y
44 4 172 T
943 1 21 L
44 5 099 X
44 4 170 D
40 2 114 Q
926 3 91 J

44 1 301 A	Base
44 1 603 H	Left internal side-plate
44 3 016 R	Aligning and shifting control cranck
44 3 355 H	Register guide and stop block
44 4 100 G	Register plate support pivot
44 4 170 D	Main connecting-rod lower crank
44 4 172 T	Lower crank shaft
44 4 189 V	Ring for 44 3 016 R
44 4 396 U	Support column for register inversion control plate
44 5 056 T	Special pin-screw
44 5 099 X	Multiplication signs control transmission lever

40 2 114 Q	Spring
40 5 121 J	Spring for 44 3 016 R
40 7 041 X	Roller for 44 4 396 U
43 1 059 Y	Special set-screw for side-plates
920 3 07 C	Set-screw for 44 3 355 H
926 3 91 J	Stud-screw for 44 5 099 X
938 3 05 G	Nut for 44 4 100 G
938 4 05 V	Nut for 44 4 396 U
938 5 05 Z	Nut for 43 1 059 Y
938 5 06 S	Nut for 44 5 056 T
943 1 21 L	Spring-holder pin
945 2 21 S	Spring clip for 44 4 396 U


920 3 07 C
938 4 05 V
44 4 396 U
44 3 355 H
945 2 21 S
44 3 016 R
40 7 041 X
44 4 189 V
40 5 121 J
44 1 603 H
938 3 05 G
A
B
44 4 100 G
44 1 301 A
44 5 056 T
938 5 06 S
V
V
1
938 5 05 Z
43 1 059 Y
44 4 172 T
943 1 21 L
44 5 099 X
44 4 170 D
40 2 114 Q
926 3 91 J

2 - FIGURE 2

Assembling the column indicator drum support and the slide transmission lever.

a) Set on the base the column indicator drum support 43 1 017 E by means of two screws 920 3 01 E.

b) Assemble on the slide transmission lever 43 2 085 C the pivot 44 2 074 S by means of the nut 938 3 51 D which should not be screwed all the way down.

Fit on the base the slide transmission lever 43 2 085 C with pivot 43 2 086 D, the nut 938 5 05 Z by interposing the split-washer 944 5 41 S.

Check that the rotation of the lever is free.

c) Between the support 43 1 017 E and the pivot of the lever 43 2 085 C hook the spring 40 5 120 V.

3 - FIGURE 2

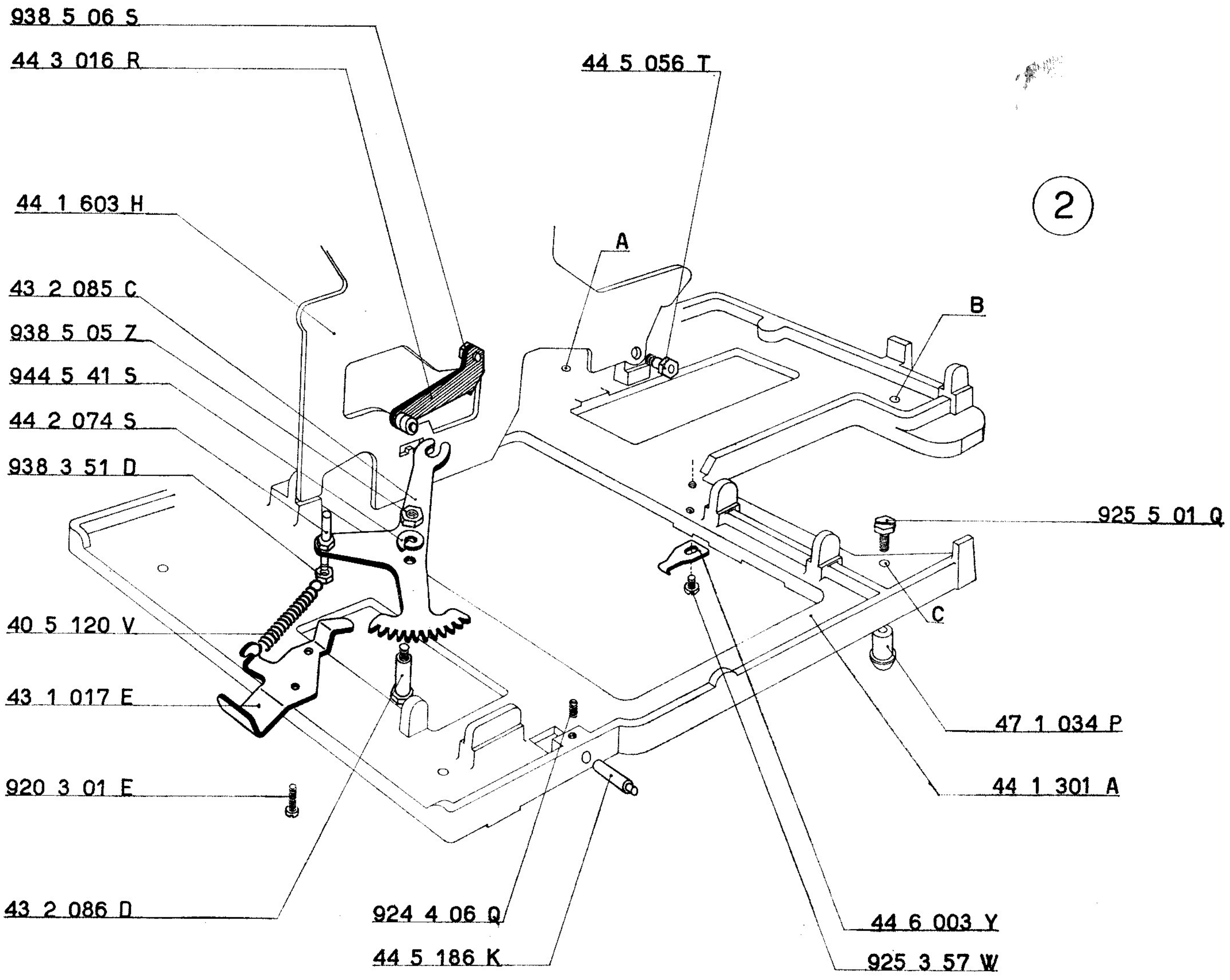
Assembling the foot-holders.

a) In the holes **A**, **B**, **C**, of the base fit by means of the screws 925 5 01 Q the foot-holders 47 1 034 P.

b) In the proper hole of the base place the pivot 44 5 186 K and the screw 924 4 06 Q which should not be tightened right home.

c) Assemble under the base the arm stop plate 44 6 003 Y by means of the screw 925 3 57 W (not tightened right home).

44 1 301 A	Base
44 1 603 H	Left internal side-plate
44 2 074 S	Slide transmission adjustable pivot
44 3 016 R	Aligning and shifting control crank
44 5 056 T	Special pin-screw
44 5 186 K	Servomechanism control bridge pivot
44 6 003 Y	Arm stop plate
40 5 120 V	Spring for 43 2 085 C
43 1 017 E	Column indicator drum support
43 2 085 C	Slide transmission lever
47 1 034 P	Foot-holder
920 3 01 E	Set-screw for 43 1 017 E
924 4 06 Q	Screw for 44 5 186 K
925 3 57 W	Special set-screw for 44 6 003 Y
925 5 01 Q	Set-screw for 47 1 034 P
938 3 51 D	Nut for 44 2 074 S
938 5 05 Z	Nut for 43 2 085 C
938 5 06 S	Nut for 44 3 016 R
944 5 41 S	Split washer for 43 2 085 C


938 5 06 S
44 3 016 R
44 5 056 T
2
44 1 603 H
A
B
43 2 085 C
938 5 05 Z
944 5 41 S
44 2 074 S
938 3 51 D
925 5 01 Q
C
40 5 120 V
43 1 017 E
47 1 034 P
44 1 301 A
920 3 01 E
43 2 086 D
924 4 06 Q
44 6 003 Y
44 5 186 K
925 3 57 W

4 - FIGURE 3

Assembling the slide shaft guide left plate.

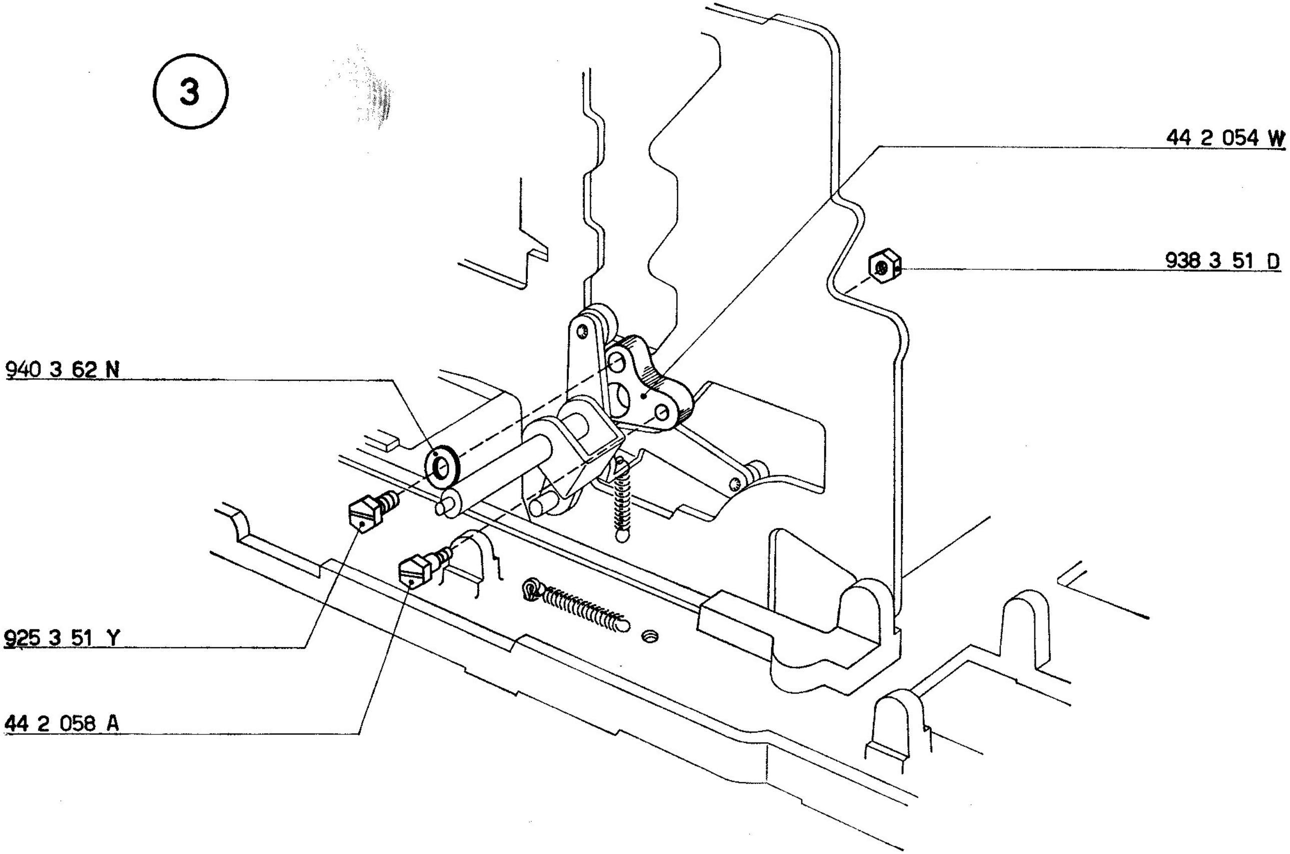
Assemble on the left internal side-plate the slide shaft guide left plate 44 2 054 W by means of:

— the pin-screw 44 2 058 A with nut 938 3 51 D
— a screw 925 3 51 Y with washer 940 3 62 N.

The plate should be moved until the screw 925 3 51 Y *is centered with respect to the hole drilled in the plate. The two screws should not be tightened right home.*

44 2 054 W	Slide shaft guide left plate
44 2 058 A	Setting pin-screw for 44 2 054 W
925 3 51 Y	Set-screw for 44 2 054 W
938 3 51 D	Nut for 44 2 058 A
940 3 62 N	Washer for 925 3 51 Y

③


44 2 054 W
938 3 51 D
940 3 62 N
925 3 51 Y
44 2 058 A

5 - FIGURES 4 and 5

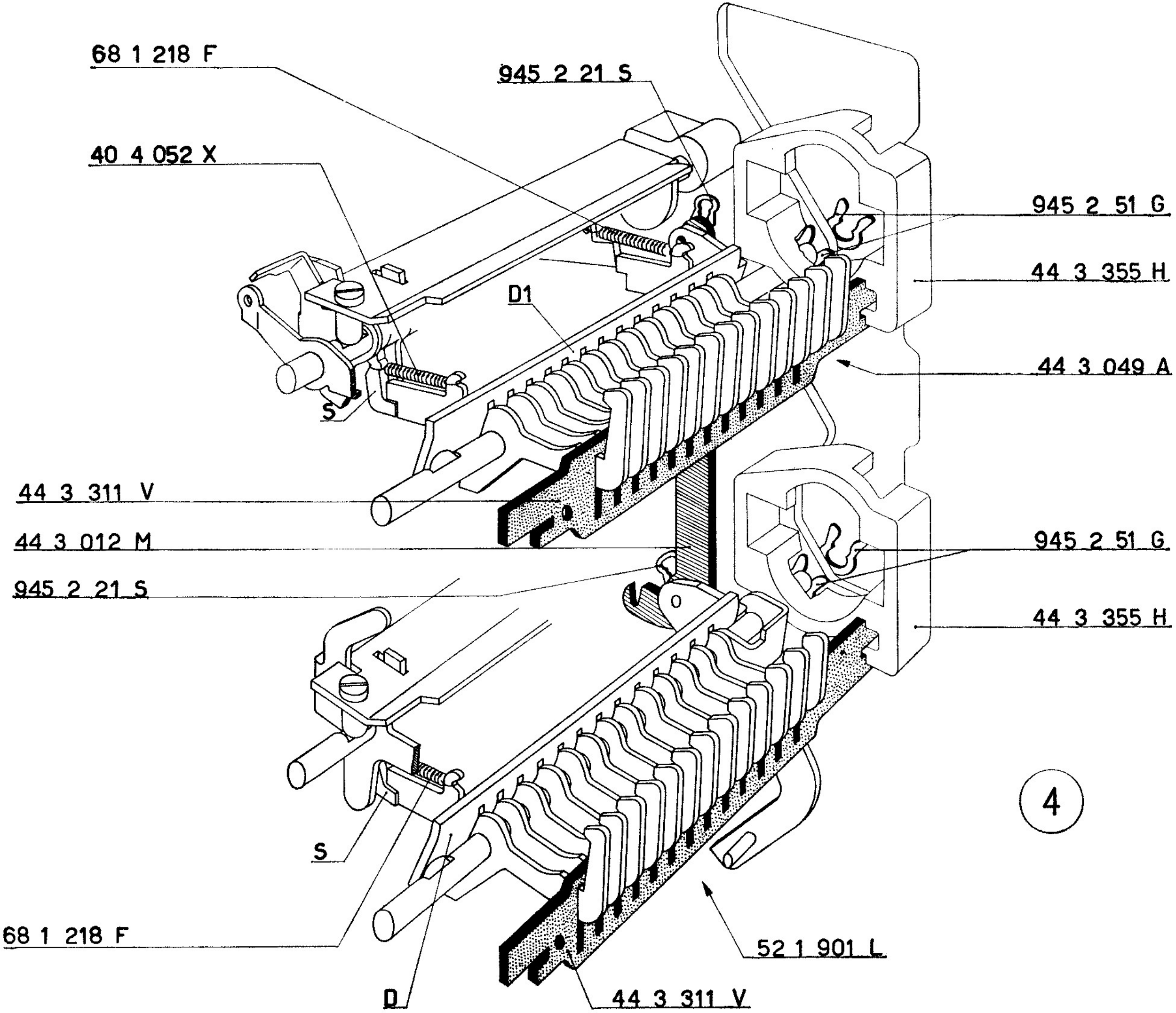
Assembling the transmission sectors and transmission levers units.

N.B. — The above units are grounded; this is why it is not possible replacing parts of them without misadjusting all the unit and endangering the good working of the calculator. We therefore supply complete units only.

a) Place on the first register transmission levers unit 52 1 901 L, well orientated, the comb 44 3 311 V. On the comb **D** of the same unit assemble the small connecting-rod 44 3 012 M stopping it with a spring clip 945 2 21 S (figure 4).

b) Assemble the unit 52 1 901 L on the left internal side-plate of the machine (fig. 4). The shaft must be inserted in the proper hole of the side-plate while the comb 44 3 311 V must be placed in the guide slot of the lower block 44 3 355 K. Secure the shaft by means of two spring clips 945 2 51 G.

44 3 012 M	Aligning connecting-rod
44 3 049 A	Second register transmission levers unit
44 3 311 V	Transmission levers guide comb
44 3 355 H	Register guide and stop block
40 4 052 X	Spring for first right sector and lever (second register)
52 1 901 L	First register transmission levers unit
68 1 218 F	Spring for transmission sectors and levers
945 2 21 S	Spring clip for 44 3 012 M
945 2 51 G	Spring clip for the shaft of the unit 52 1 901 L and 44 3 049 A


68 1 218 F
945 2 21 S
40 4 052 X
945 2 51 G
44 3 355 H
D1
44 3 049 A
S
44 3 311 V
44 3 012 M
945 2 21 S
945 2 51 G
44 3 355 H
4
S
68 1 218 F
52 1 901 L
D
44 3 311 V

c) To the twelve sectors **S** and to the comb **P** of the unit 44 3 047 Y (figure 4) hook the springs 68 1 218 F.

On the shaft of the unit place shifting bar control arm 44 3 017 J with the two screws 920 3 02 F.

Assemble the unit on the left internal side-plate of the machine by inserting the shaft in the proper guide hole.

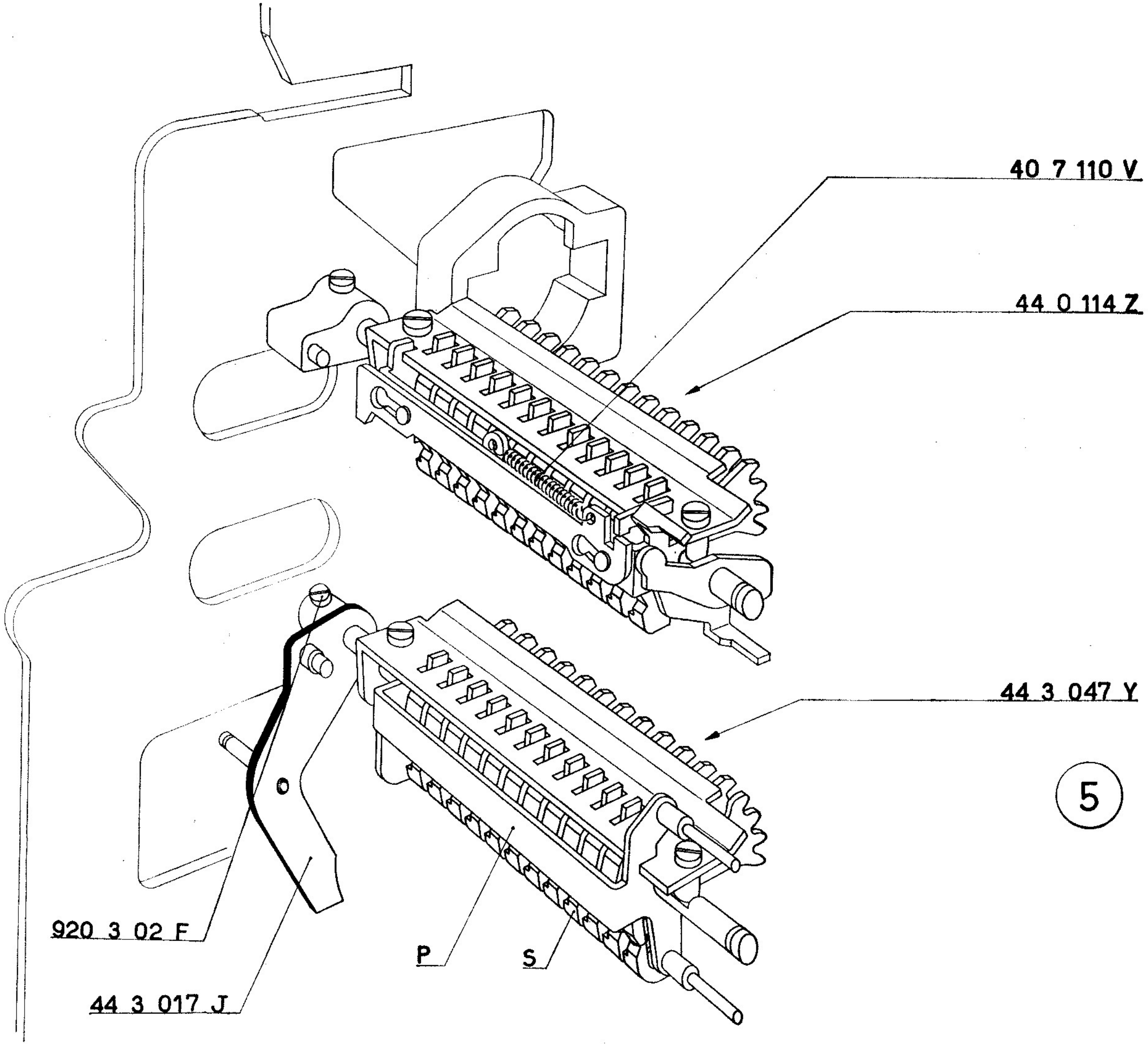
Hook the springs 68 1 218 F to the transmission lever (fig. 4).

d) By following the same instructions assemble the second register transmission levers unit 44 3 049 A and the second register transmission sectors unit 44 0 114 Z which should take the position illustrated in the figures 4 and 5.

e) Connect the connecting-rod 44 3 112 M to the comb **D1** of the unit 44 3 049 A (figure 4) setting it by means of a spring clip 945 2 21 S.

N.B. — The springs hooked between the second register transmission levers and sectors are always the 68 1 218 F but for the first sector and the proper right lever between which it is necessary to hook the spring 40 4 052 X.

44 0 114 Z	Second register transmission sectors unit
44 3 017 J	Shifting bar control arm
44 3 047 Y	First register transmission sectors unit
40 7 110 V	Spring for 44 0 114 Z
920 3 02 F	Set-screws for 44 3 017 J


40 7 110 V
44 0 114 Z
44 3 047 Y
5
920 3 02 F
44 3 017 J
P
S

6 - FIGURE 6

Preparing the racks unit.

a) In the first left slot of the main racks spring-holder comb 44 3 001 T place well orientated the 13th rack 44 3 023 Q. To the proper hole of the comb hook the spring 68 0 310 J; the other end of the spring must be hooked to the pivot **P** of the rack.

b) By following the same instructions, assemble successively all the twelve racks 44 3 002 U with their springs 68 0 310 J.

c) In the slot **B** of the comb 44 3 001 T place the special signs rack 44 7 094 L. Use also the spring 68 0 310 J.

d) In the slots **A** of the comb 44 3 001 T place the second register special signs rack 44 7 103 S which doesn't include the upper wing. Use also the spring 68 0 310 J.

e) Pivot the 15 racks by means of the lower shaft 44 3 013 N.

f) Place the lower guide extension of the racks in the proper slots of the lower comb 44 3 008 A.

7 - FIGURE 6

Assembling the racks unit.

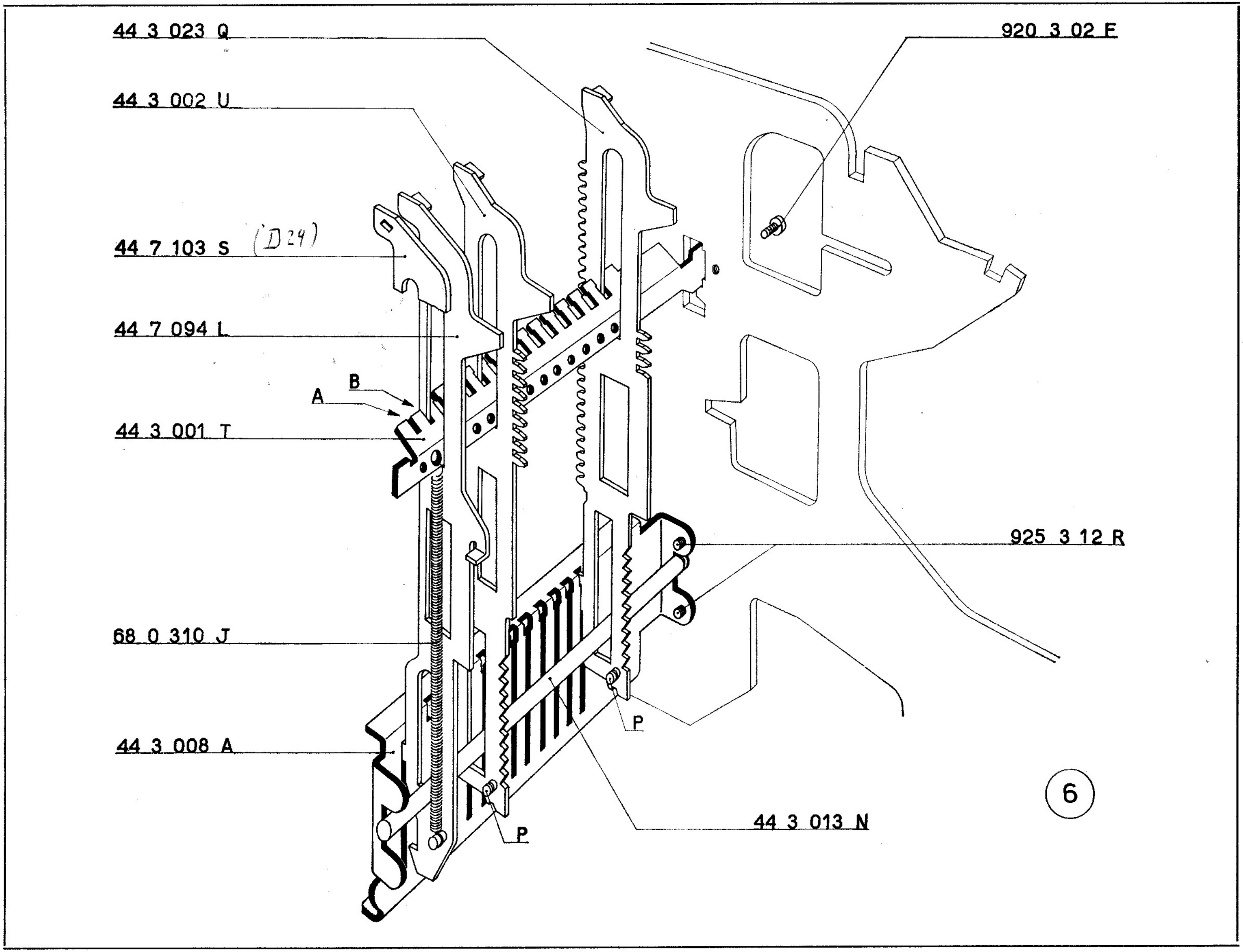
The racks unit prepared according the instructions given at paragraph 6 should be assembled on the left internal side-plate of the machine as illustrated in the figure.

See that:

— the comb 44 3 001 T is inserted in the proper opening and secured by means of a screw 920 3 02 F. Before tightening the screw, move the comb in contact with the proper seat.

— the lower comb 44 3 008 A must be set by means of two screws 925 3 12 R; this comb establishes also the axial position of the shaft 44 3 013 N. The screws should not be tightened right home and must be place in the middle of the proper slots.

44 3 001 T	Racks spring-holder comb
44 3 002 U	Rack
44 3 008 A	Racks guide lower comb
44 3 013 N	Racks guide lower shaft
44 3 023 Q	13th rack
44 7 094 L	First register special signs rack
44 7 103 S	Second register special signs rack
68 0 310 J	Springs for 44 3 002 U, 44 3 023 Q, 44 7 094 L and for 44 7 103 S
920 3 02 R	Screws for 44 3 001 T
925 3 12 R	Screws for 44 3 008 A


44 3 023 Q
920 3 02 E
44 3 002 U
44 7 103 S
(D24)
44 7 094 L
B
A
44 3 001 T
925 3 12 R
68 0 310 J
P
44 3 008 A
⑥
44 3 013 N
P

8 - FIGURE 7

Preparing the right internal side-plate.

a) Secure on the right internal side-plate 44 1 715 Y:
— the special screw 50 6 007 Z with the nut 938 3 51 D
— the support pivot of the register plate 44 4 104 Y with the nut 938 3 05 G
— the guide pivot of the stops clearing plate 44 2 081 J with the nut 938 3 05 G.

b) On the proper pivot of the side-plate 44 1 715 Y place the stroke-counter frames control arm 44 5 114 J which should be secured with a spring clip 945 3 41 A.

c) Hook the spring 40 5 123 L to the proper hole of the side-plate 44 1 715 Y.

9 - FIGURE 7

Assembling the right internal side-plate.

a) Assemble on the base of the machine the right internal side-plate 44 1 715 Y seeing that:
— the cambs 44 3 311 V which guide the transmission levers (fig. 4) are placed in the proper sloas of the small blocks **K**
— the shafts **A** of the transmission sector and the shaft **B** of the transmission levers are inserted in the guide holes
— the comb 44 3 001 T and the shaft 44 3 013 N of the racks unit are inserted in the proper guide seats.

b) Secure the side-plate to the base by means of two screws 43 1 059 Y with the nuts 938 5 05 Z.

c) Secure the comb 44 3 008 A by means of the two pivots 44 2 081 J which must not tightened right home and should be placed in the middle of their proper slots.

d) Between the two internal side-plates place the connecting shaft 44 1 008 G stopping it with the two columns 43 1 016 D. This is a temporary assembly which doesn't allow the bending of the side-plates.

e) *Check that the racks slide well.*

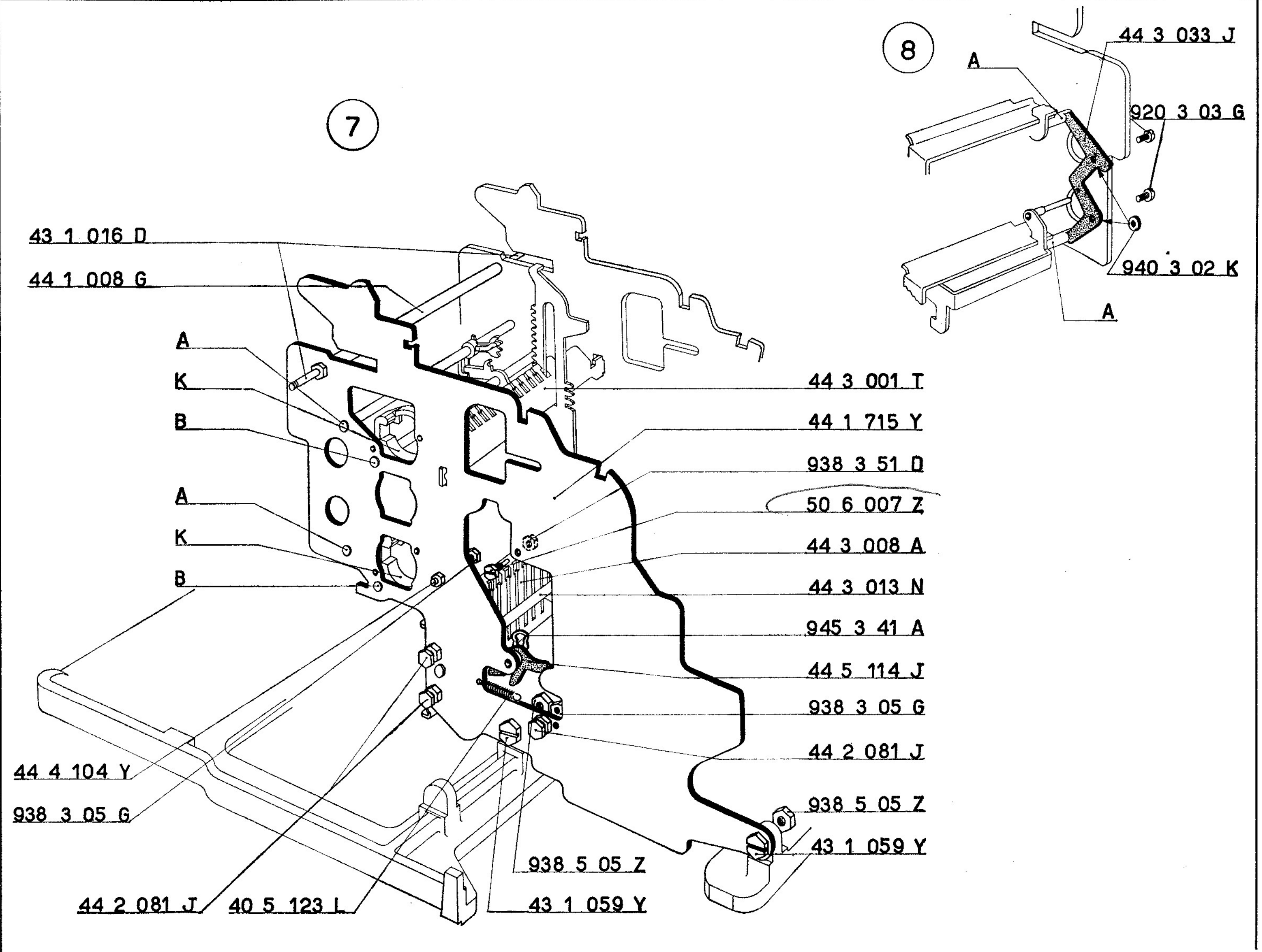
10 - FIGURE 8

Securing the shafts of the transmission sectors units.

Secure the two shafts **A** of the transmission sectors by means of the small plate 44 3 033 J. Between this latter and the side-plate of the machine place the washers 940 3 02 K; secure the small plate with the two screws 920 3 03 G.

44 1 008 G	Side-plates connection shaft
44 1 715 Y	Right internal side-plate
44 2 081 J	Guide pivot of the stops clearing plate
44 3 001 T	Racks spring holder comb
44 3 008 A	Racks guide lower comb
44 3 013 N	Racks guide lower shaft
44 3 033 J	Transmission sectors shafts securing plate
44 4 014 Y	Support pivot of the register carrying plate
44 5 114 J	Stroke-counter frames control arm
40 5 123 L	Spring

43 1 016 D	Ribbon advance pawls columns
43 1 059 Y	Special set-screws for side-plates
50 6 007 Z	Special screw
920 3 03 G	Set-screw for 44 3 033 J
938 3 05 G	Nut for 44 2 081 J and 44 4 104 Y
938 3 51 D	Nut for 50 6 007 Z
938 5 05 Z	Nut for 43 1 059 Y
940 3 02 K	Washers for 44 3 033 J
945 3 41 A	Spring clip for 44 5 114 J


7
8
43 1 016 D
44 1 008 G
A
K
B
A
K
B
44 3 001 T
44 1 715 Y
938 3 51 D
50 6 007 Z
44 3 008 A
44 3 013 N
945 3 41 A
44 5 114 J
938 3 05 G
44 2 081 J
938 5 05 Z
43 1 059 Y
44 4 104 Y
938 3 05 G
938 5 05 Z
43 1 059 Y
44 2 081 J
40 5 123 L
A
44 3 033 J
920 3 03 G
940 3 02 K
A

11 - FIGURE 9

Assembling the racks stop upper shaft and the racks guide rear comb.

a) Between the two internal side-plates of the machine place well orientated the shaft 44 3 009 B which must be inserted in the upper slots of the racks. Secure the shaft by means of a washer 940 3 38 N and of the side-plates connecting left column 44 1 011 J.

b) Between the two internal side-plates of the machine place the racks guide rear comb 44 3 014 P. The racks must be inserted in the guide holes of the comb. Secure the comb by means of a screw 925 3 06 U. *Push the comb forward and then tighten the screw right home.*

12 - FIGURE 10

Assembling the racks universal bar.

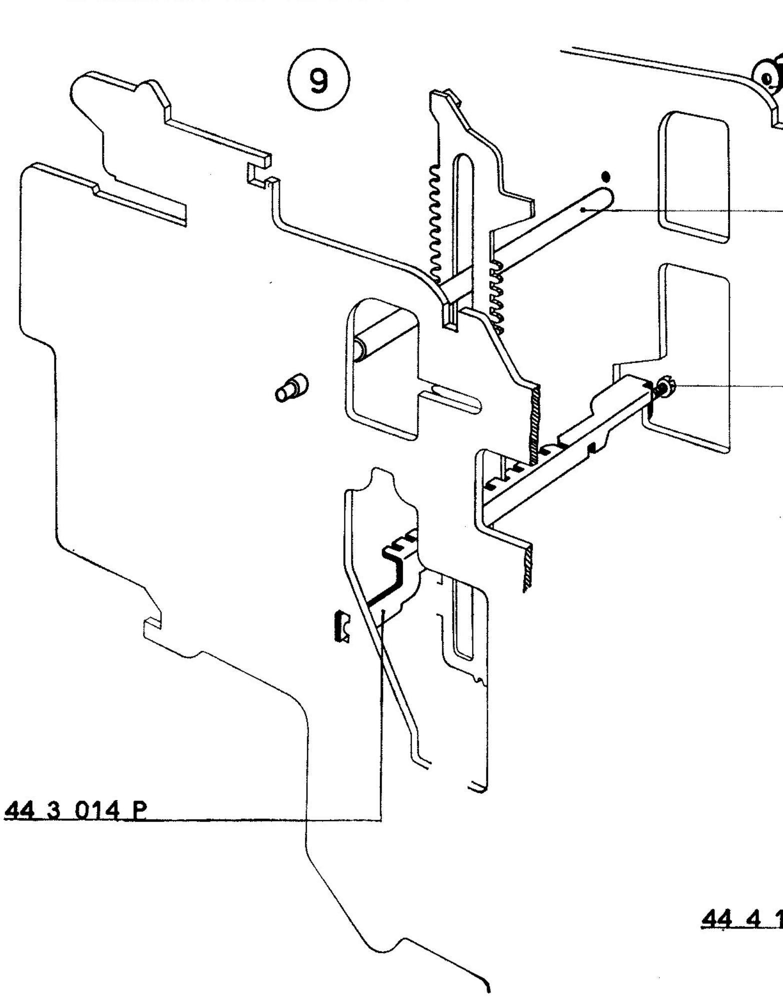
a) Between the internal side-plates of the machine place well orientated the shaft 44 4 166 V. Place on it the racks universal bar bridge 44 4 165 U which must be secured by means of three screws 920 3 03 G.

b) On the tenons **T** of the bridge 44 4 165 U place the leaf-spring 44 4 168 F and then assemble the small bar 43 4 137 E between the two arms of the bridge. .

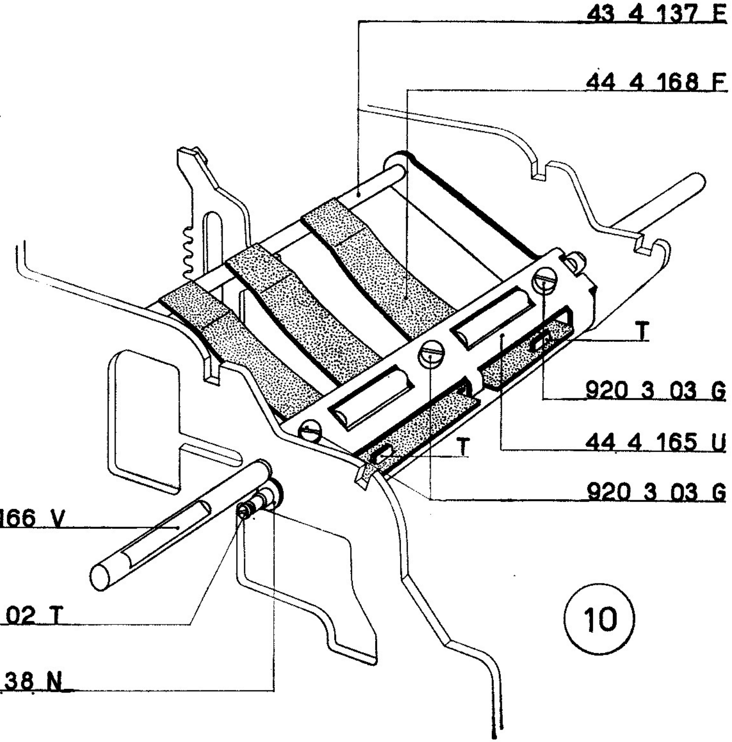
c) Secure the shaft 44 4 166 V with the washer 940 3 38 N and the spring-holder 936 3 02 T.

44 1 011 J	Side-plates connecting left column
44 3 009 B	Racks stop upper shaft
44 3 014 P	Racks guide rear comb
44 4 165 U	Racks universal bar bridge
44 4 166 V	Shaft of the racks universal bar bridge
44 4 168 F	Leaf-spring for racks frame
43 4 137 E	Main racks frame small bar
920 3 03 G	Set-screw for 44 4 165 U
925 3 06 U	Set-screw for 44 3 014 P
936 3 02 T	Spring-holder
940 3 38 N	Washer

9


44 1 011 J
940 3 38 N
44 3 009 B
925 3 06 U
44 3 014 P

10


43 4 137 E
44 4 168 F
T
920 3 03 G
44 4 165 U
T
920 3 03 G
44 4 166 V
936 3 02 T
940 3 38 N

13 - FIGURE 11

Adjusting temporarily the racks guide lower comb.

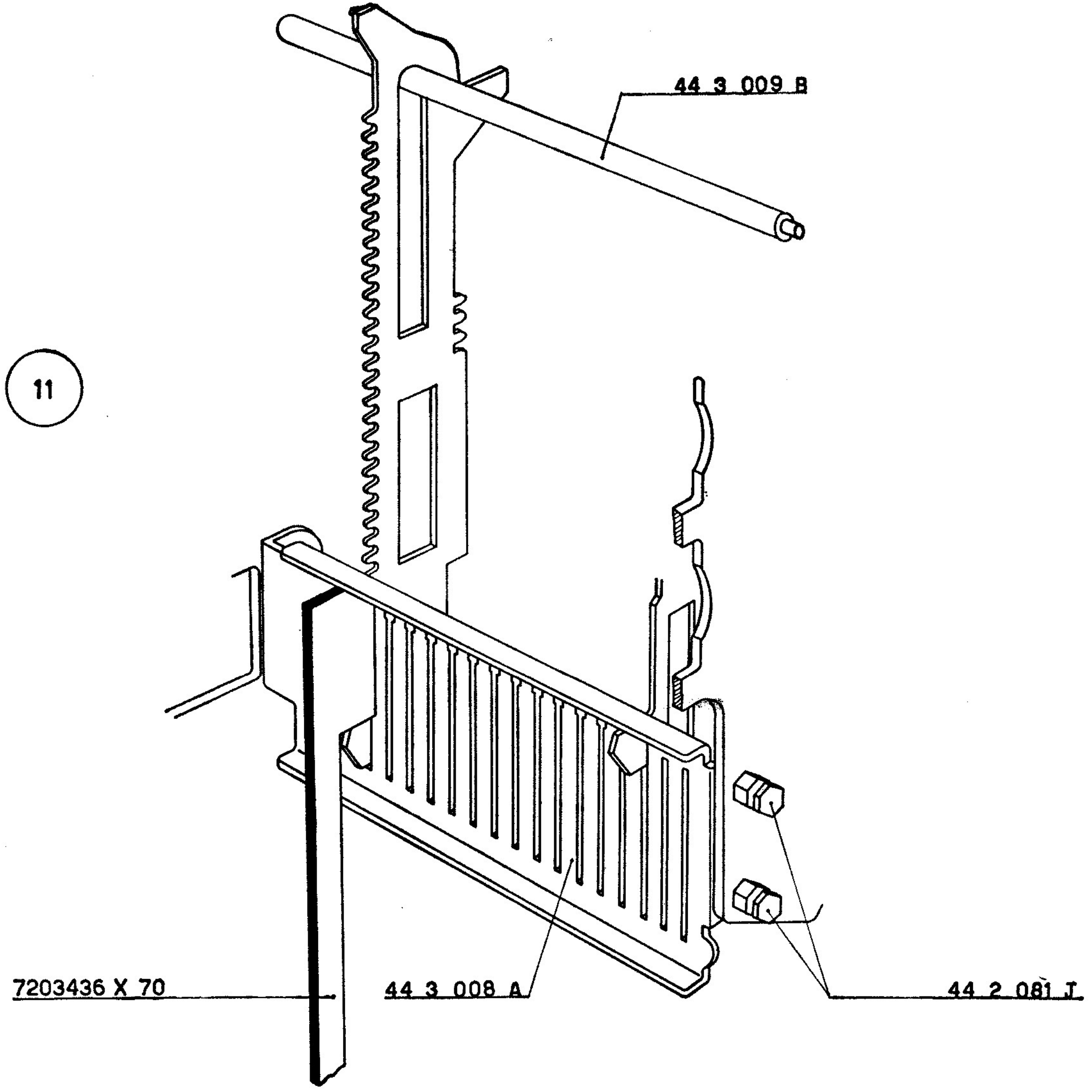
a) Depress the first left rack stopping it against the shaft 44 3 009 B. *Place the gauge* 7213436 X 70 *as illustrated in the figure and move vertically the comb* 44 3 008 A *so that the gauge is slightly checked. Screw but not right home the two screws securing the comb* 44 3 008 A *a the left.*

b) Depress the first right rack and by following the same instructions do the same adjustment. Screw but not right home the two pivots 44 2 081 J.

c) Check the adjustment and tighten the screws and the pivots.

d) See that the racks slide well.

44 2 081 J	Stops clearing plate guide pivot
44 3 008 A	Racks guide lower comb
44 3 009 B	Racks stop upper shaft


44 3 009 B
⑪
7203436 X 70
44 3 008 A
44 2 081 J

14 - FIGURe 12

Assembling the shift control bar connection connecting-rod.

a) Connect the crank **M** to the arm 44 3 017 J by means of the small connecting-rod 44 3 025 J which must be secured with two spring clips 945 2 21 S.

b) Hook the spring 68 0 604 N between the small connecting-rod 44 3 012 M and the flexible arm **B** of the transmission levers lower unit.

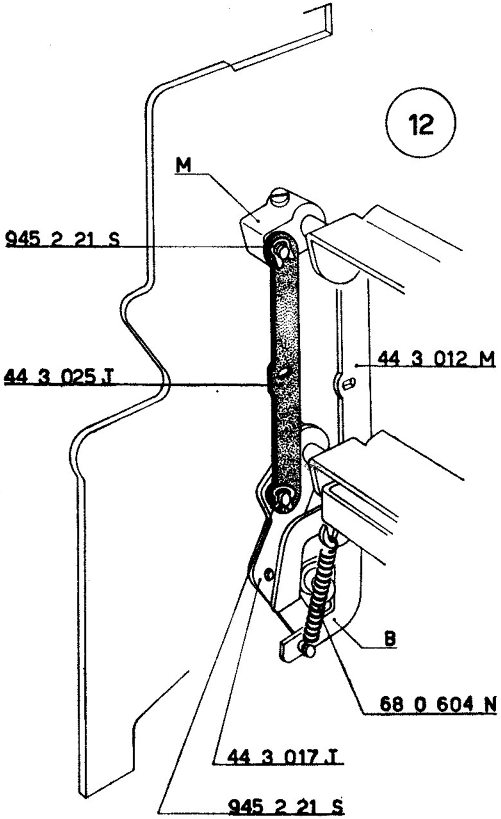
15 - FIGURE 13

Preparing the register carrying plates.

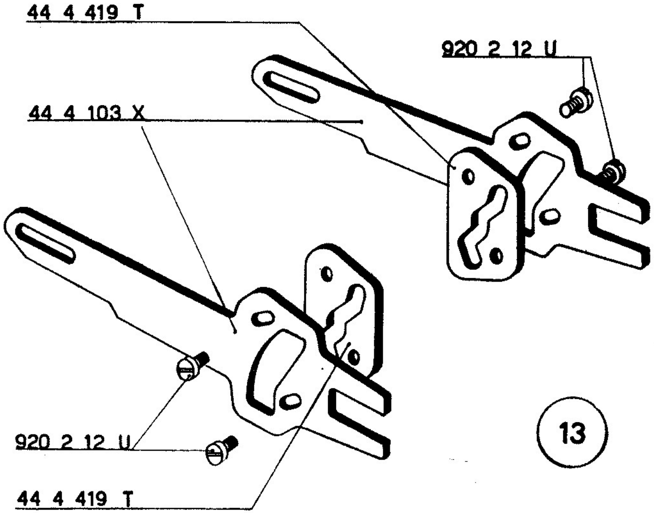
a) In the figure we have illustrated a couple of register carrying plates 44 4 103 X (left and right). On each plate assemble well orientated and by means of the screws 920 2 12 U the cam 44 4 419 T. *The screws should be placed in the middle of the proper slot and then tightened right home.*

b) By following the same instructions prepare a second couple of register carrying plates.

44 3 012 M	Aligning connection connecting-rod
44 3 017 J	Shifting bar control arm
44 3 025 J	Shifting control bar connection connecting-rod
44 4 103 X	Register carrying plate
44 4 419 T	Register carrying plate cam
68 0 604 N	Spring for 44 3 012 M
920 2 12 U	Set-screw for 44 4 419 T
945 2 21 S	Spring clip for 44 3 025 J


12

M
945 2 21 S
44 3 025 J
44 3 012 M
B
68 0 604 N
44 3 017 J
945 2 21 S


13

44 4 419 T
920 2 12 U
44 4 103 X
920 2 12 U
44 4 419 T

16 - FIGURES 14 and 15

Register.

The preparation of the register unit and the coupling of its side-plates with stop and guide blocks require controls which can be done at the works only with particular and special tools.

This it why we don't supply the two small side-plates and the two wheels carrying shafts as spare parts. If one of these parts is worn out or defective it is necessary to replace the complete register.

To replace one of the other parts it is necessary to hold still the connection between the two small side-plates by means of at least one of the two wheels carrying shafts.

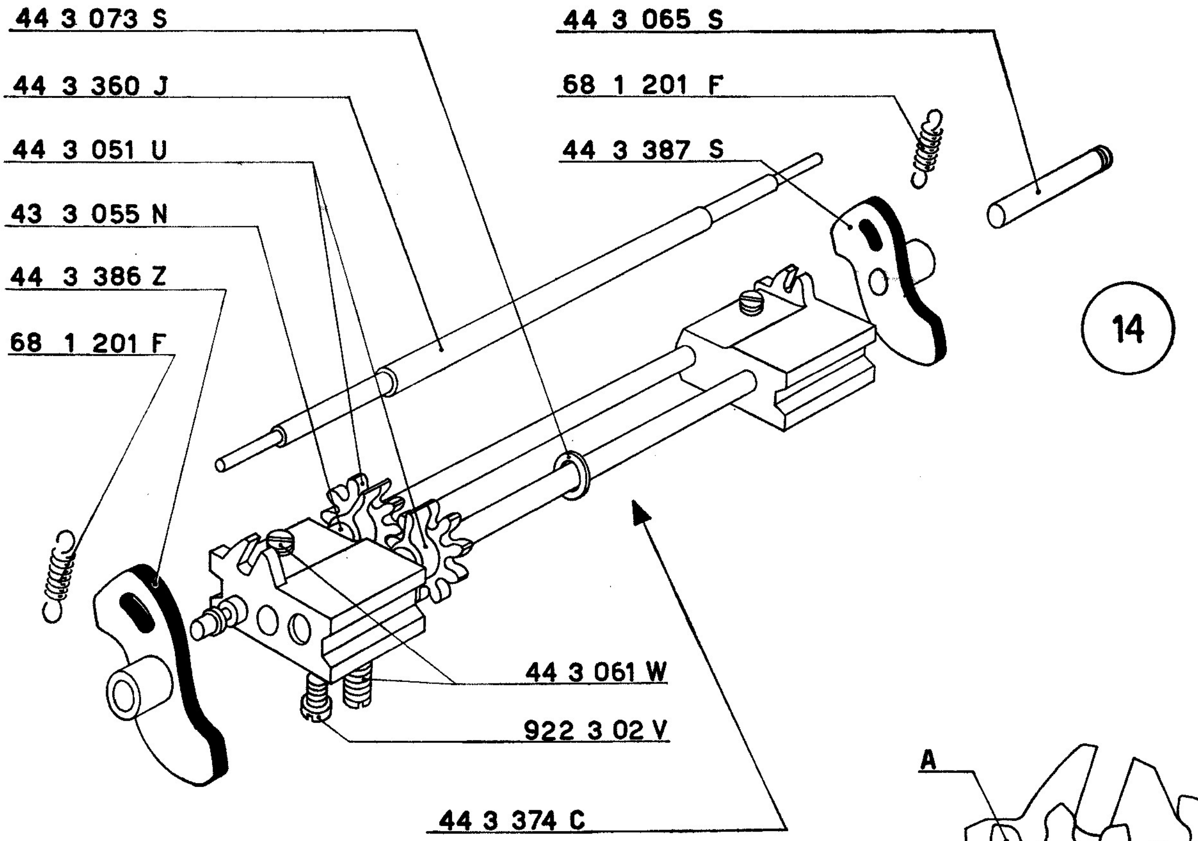
If a wheel must be replaced we sugget you to remove the proper shaft by pushing it with a pin until to reach the wheel to be changed. We can therefore replace it without disassembling all the wheels. Afterward it is necessary to push the shaft back exactly were it was before replacing the wheel and then to tighten the screws in their seats.

If the axial play of the wheel should be reduced (which should be 0.2÷0.3 mm. about), we suggest you to use one or more washers 44 3 073 S.

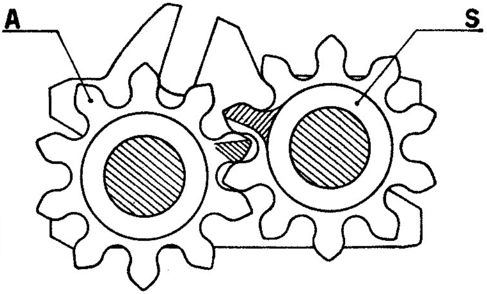
In the figure 15 we have illustrated the adjustment between the adding wheels **A** and the subtracting wheels **S**.

The register parts which can be supplied as spare parts are those listed below.

44 3 051 U	Register wheel
44 3 061 W	Register shaft ser-screw
44 3 065 S	Register right pivot
44 3 073 S	Whasher (if necessary)
44 3 360 J	Locking bar
44 3 374 C	Complete register
44 3 386 Z	Locking bar left rocker
44 3 387 S	Register shafts ser-screw
43 3 055 N	Spacing tube
68 1 201 F	Locking bar spring
922 3 02 V	Screw for 44 3 065 S


44 3 073 S
44 3 360 J
44 3 051 U
43 3 055 N
44 3 386 Z
68 1 201 F
44 3 065 S
68 1 201 F
44 3 387 S
44 3 061 W
922 3 02 V
44 3 374 C

⑭


A
S

⑮

17 - FIGURE 16

Assembling the first register engagement and disengagement frame.

a) Place the washer 940 5 19 C on the shaft of the lever 44 4 689 A.

b) In the proper guide hole of the right internal side-plate of the machine insert the shaft of the lever 44 4 689 A on which should be located the spring 68 0 503 H.

Place the shaft in the corresponding guide hole of the left internal side-plate of the machine.

c) Assemble the register carrying plate 44 4 103 X as illustrated in the figure and secure therefore the shaft of the 44 4 689 A by means of a spring clip 945 3 41 A.

d) On the end of the shaft of the 44 4 689 A place the lever 44 4 088 T with the screws 922 3 02 V. *Adjust the axial position of the lever 44 4 088 T to leave a play of 0.2 mm. to the shaft.* Tighten but not right home one of the two screws 922 3 02 V.

18 - FIGURE 17

Assembling the first register.

a) In the central hole of the first register left side-plate insert the pivot 44 3 063 Y on which you shall place the left register carrying plate 44 4 103 X. Secure the pivot by screwing but not right home the proper set-screw.

b) Assemble between the side-plates of the machine the first register; see that:

— the right pivot 44 3 065 S is inserted in the guide hole of the right register carrying plate 44 4 103 X

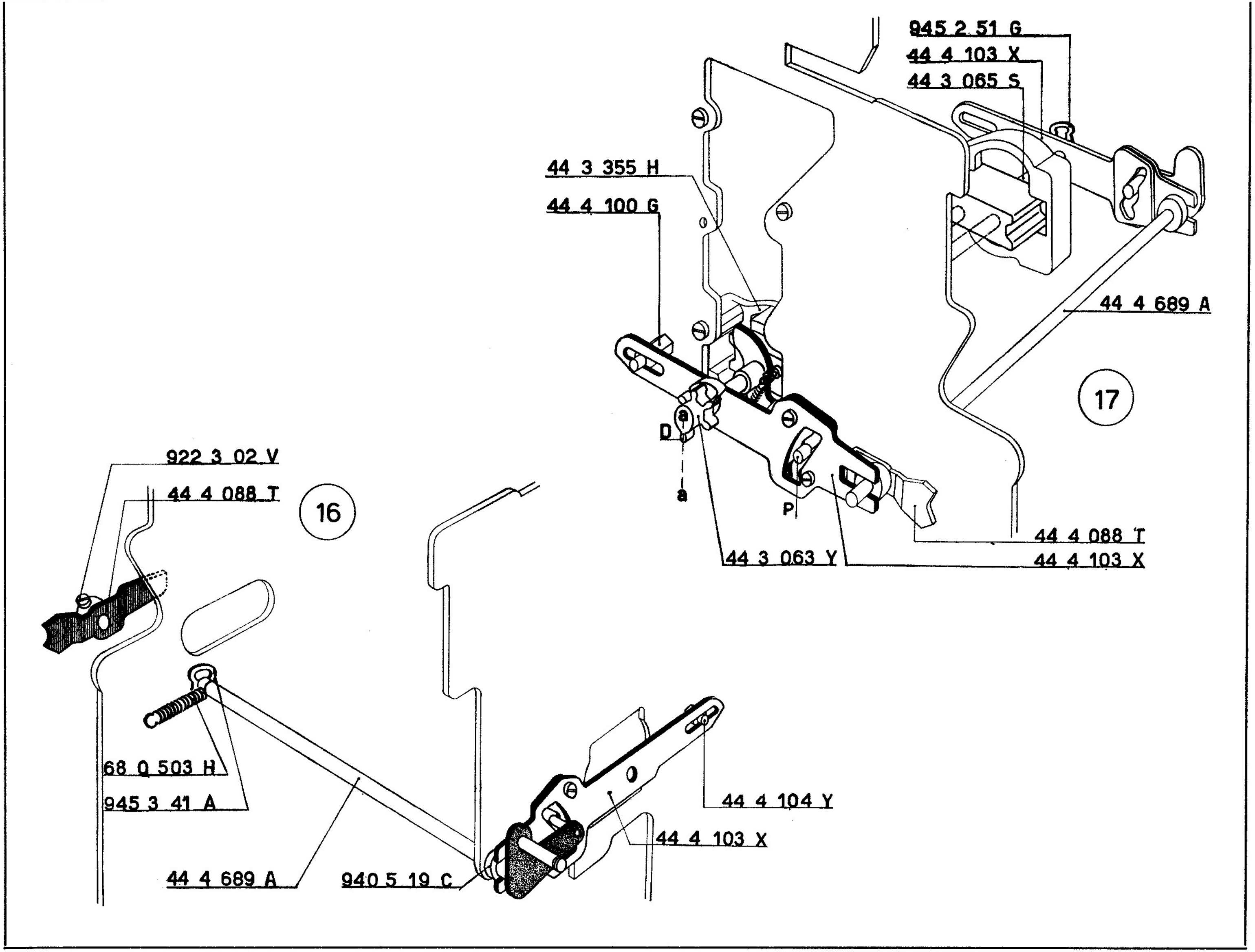
— the left register carrying plate 44 4 103 X is placed on the pivot 44 4 100 G and on the shaft of the lever 44 4 689 A

— the pivot **P** of the lever 44 4 088 T is inserted in the slot of the cam secured on the left plate 44 4 103 X.

c) Secure the register right pivot 44 3 065 S by means of a spring clip 945 2 51 G.

d) Center temporarily the register with respect to the racks and reduce the axial play to the minimum. The two conditions are obtained by moving suitably the two pivots 44 3 063 Y and 44 3 065 S. Once the wanted conditions are obtained tighten but not right home the screws securing the two pivots.

44 3 063 Y	Register left pivot
44 3 065 S	Register right pivot
44 3 355 H	Register guide and stop block
44 4 088 T	Register engagement and disengagement control frame left lever
44 4 100 G	Register plate support pivot
44 4 103 X	Register carrying plate
44 4 104 Y	Register carrying plate support pivot
44 4 689 A	Shaft with right lever of the register engagement and disengagement control frame
68 0 503 H	Spring
922 3 02 V	Set-screw for 44 4 088 T
940 5 19 C	Washer for 44 4 689 A
945 2 51 G	Spring clip for 44 3 065 S
945 3 41 A	Spring clip for 44 4 689 A


945 2 51 G
44 4 103 X
44 3 065 S
44 3 355 H
44 4 100 G
44 4 689 A
17
D
a
a
P
44 4 088 T
44 4 103 X
44 3 063 Y
922 3 02 V
44 4 088 T
16
68 0 503 H
945 3 41 A
44 4 104 Y
44 4 103 X
44 4 689 A
940 5 19 C

19 - FIGURE 17

Adjusting the register guide and stop block and the first register engagement and disengagement control frame.

a) Loosen a little the two screws securing the register guide and stop block 44 3 355 H.

b) Rotate the two levers 44 4 689 A *and* 44 4 088 T *downward so that the proper pivots are in contact with the right and left plates* 44 4 103 X. *Tighten the screws of the lever* 44 4 088 T *checking that the shaft of the lever* 44 4 689 A *has the prescribed play of 0,2 mm.*

c) By rotating downward the two levers 44 4 088 T *and* 44 4 689 A *the register has moved forward and is guided by its two later blocks. The position of the left block* 44 3 355 H *is thus established; tighten terefore the screws.*

20 - FIGURE 17

Final setting of the axial position of the first register.

a) To make the final setting of the axial position of the register it is necessary to align the transmission teeth and to move them to a well visible position.

To do this operate as follows:

— hold the register disengaged from the racks

— move the racks so the position 0 by rotating the universal bar

— engage the register with the racks

— make the racks move up until they stop

— disengage the register and then upturn it.

b) Check that:

— the teeth of the first row of wheels are centered with respect to the racks

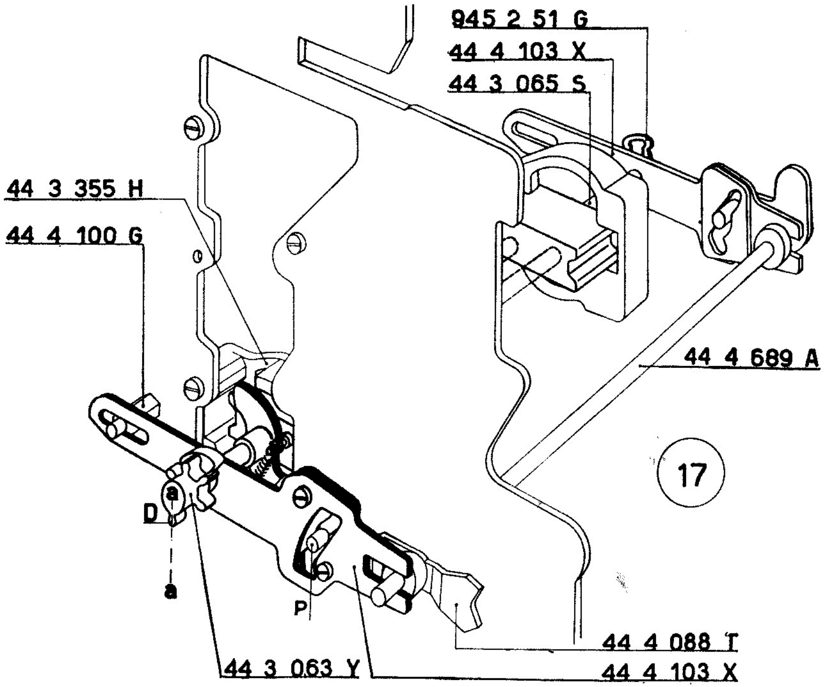
— the transmission teeth of the first row of racks are centered with respect to the transmission levers.

These conditions are obtained by moving suitably the two pivots of the register 44 3 063 Y *and* 44 3 065 S. *The axial play of the register must be void while it must rotate perfectly.*

c) The left pivot 44 3 063 Y *should take, when the register is in subtraction, the position illustrated in the figure 28, while its tooth* **D** *should be perfectly vertical (line* **a-a**).

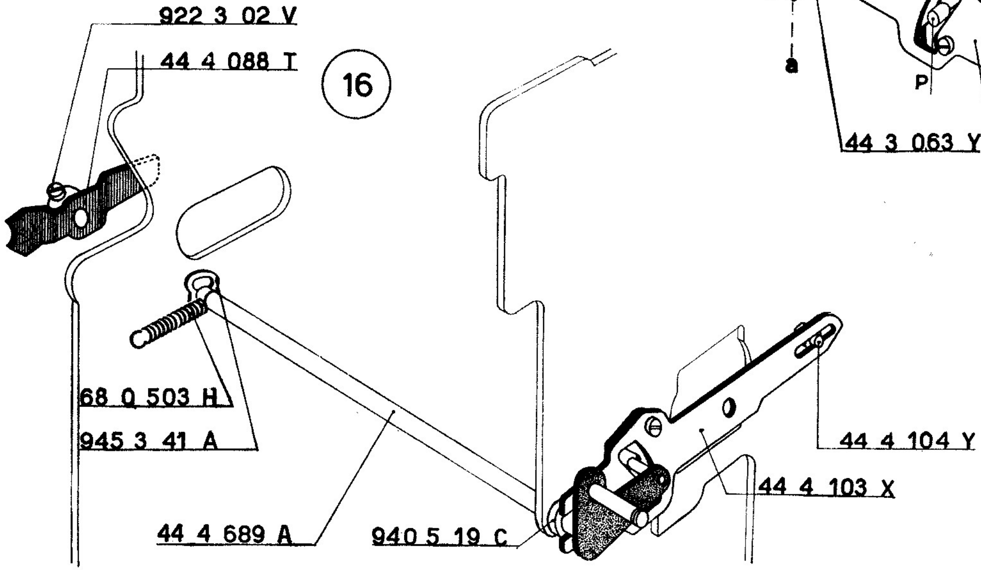
21 - Adjusting the position of the first register transmission sectors unit.

With the register wheels in the position illustrated at point a) *of the paragraph 20, check that the teeth of the second row of wheels are centered with respect to the transmission sectors and that the transmission teeth of these latters are centered with respect to the transmission teeth of the following wheels. To obtain these conditions it is necessary moving axially the transmission sectors unit by actuating the lower extension of the small plate* 44 3 033 J *(figure 8). Check the engagement of the transmission levers with the proper sectors and with the circular transmission bridge.*


945 2 51 G
44 4 103 X
44 3 065 S
44 3 355 H
44 4 100 G
44 4 689 A
D
a
a
P
44 4 088 T
44 3 063 Y
44 4 103 X

17

16


922 3 02 V
44 4 088 T
68 0 503 H
945 3 41 A
44 4 689 A
940 5 19 C
44 4 104 Y
44 4 103 X

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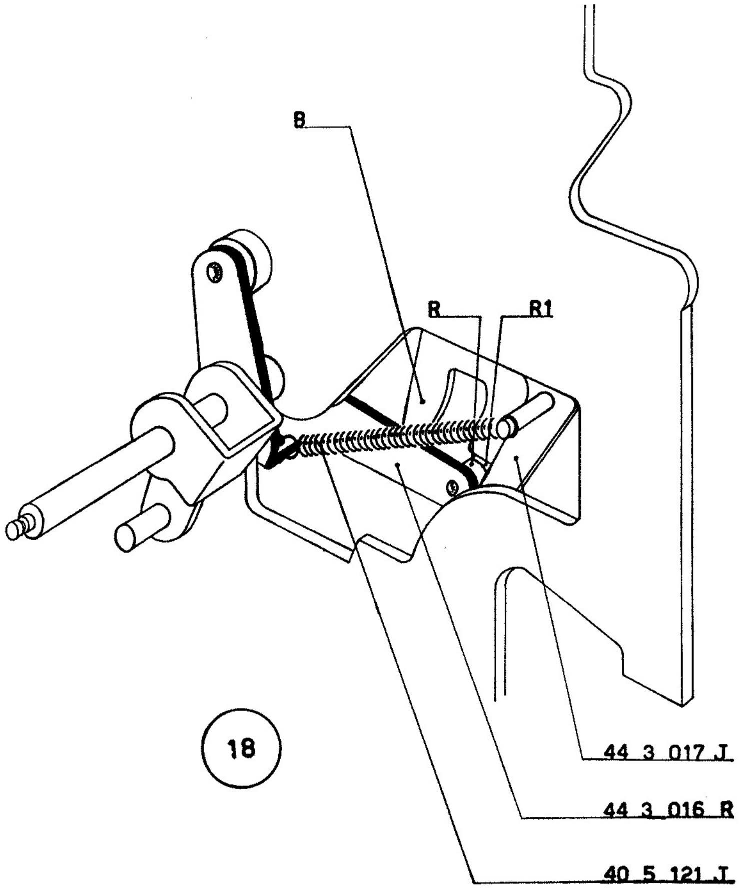
22 - FIGURE 18

Adjusting the position of the aligning and shifting control crank.

a) Hook the spring 40 5 121 J.

b) Rotate the aligning and shifting control crank 44 3 016 R *and check that its roller* **R1** *is centered with respect to the flexible arm* **B** *of the lower unit of the transmission levers. This is obtained by acting on the same* 44 3 016 R.

44 3 016 R	Aligning and shifting control crank
44 3 017 J	Shifting bar control arm
40 5 121 J	Spring for 44 3 016 R - 44 3 017 J


B
R
R1
18
44 3 017 J
44 3 016 R
40 5 121 J

23 - FIGURE 19

Temporary assembly of the main shaft and cam.

Between the two internal side-plates of the machine place the main shaft 43 4 143 L on which should de assembled the cam 44 4 361 G which must take the position illustrated in the figure.

N.B. — The holes of the side-plates in which the main shaft is placed have a larger diameter than that of the shaft. The shaft will be in fact guided by the rings set in the external side-plates of the machine (not fitted yet). For the time being the shaft is guided by these simple holes only, but the main cam takes a position which allows the adjustments described in the next paragraph.

44 3 016 R	Aligning and shifting control crank
44 3 017 J	Shifting bar control arm
44 3 015 J	Shifting control bar connecting-rod
44 4 361 G	Main cam

24 - FIGURES 20 and 21

Adjusting the first register transmissions control.

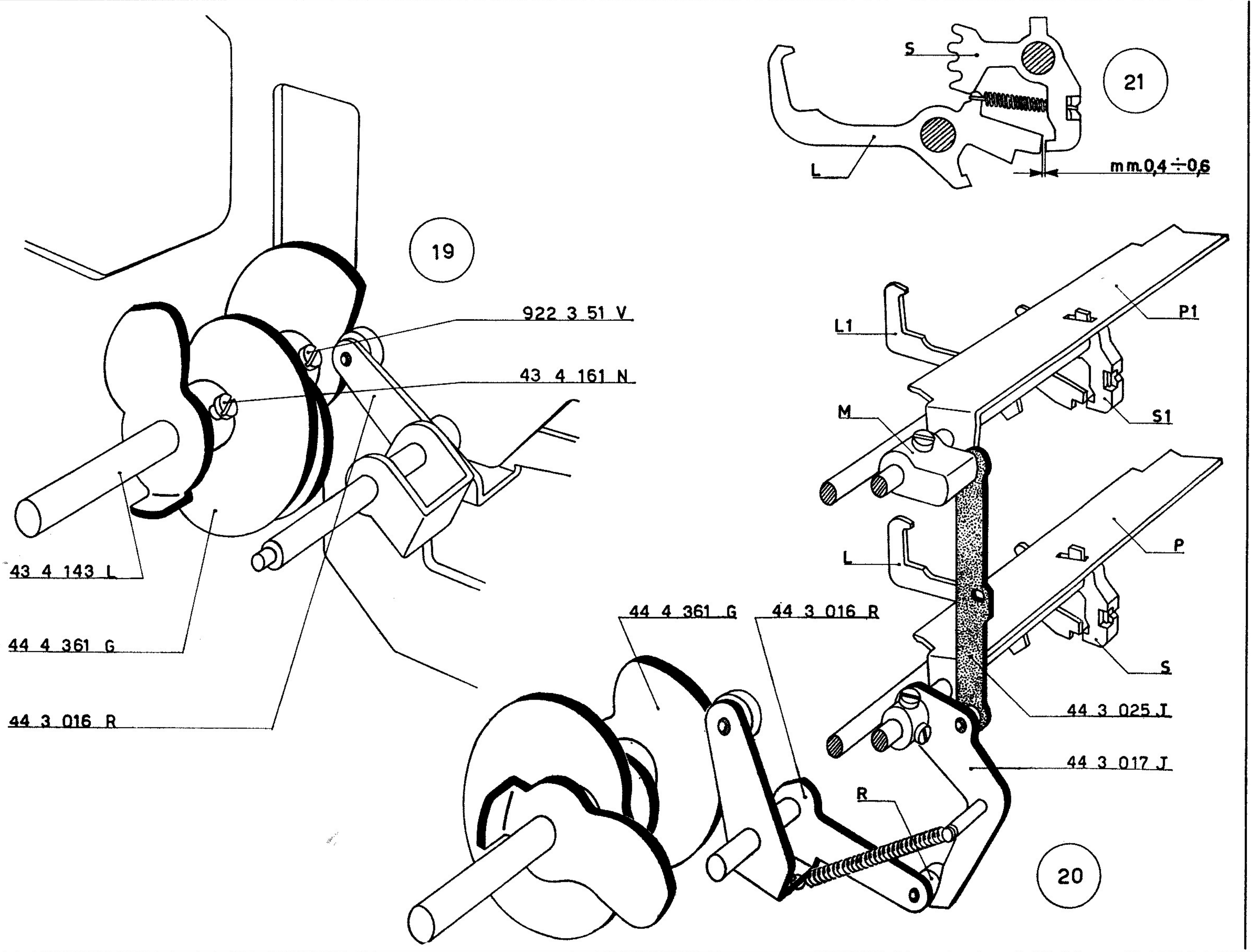
a) Loosen the screw of the crank **M.**

b) Adjust the axial position of the shifting bar control arm 44 3 017 J *so that its lower extension is centered with respect to the roller* **R** *of the crank* 44 3 016 R. *The hub of the* 44 3 017 J *must be detached a little from the left side-plate of the machine. Tighten, but not right home, one of the two screws of the arm* 44 3 017 J.

c) Rotate the main cam 44 3 361 G *so that its circular part is in contact with the roller of the crank* 44 3 016 R.

d) By holding the arm 44 3 017 J *in contact with the roller* **R** *of the crank* 44 3 016 R *adjust the angular position of the comb* **P** *so that there is the clearance of* 0.4÷0.6 *mm. shown in the figure* 21, *between the transmission levers* **L** *and the proper sectors* **S**. *Tighten the two screws of the arm* 44 3 017 J.

43 4 143 L	Main shaft
43 4 161 N	Perforating set-screw for main cam
922 3 51 V	Set-screw for main cam


S
21
L
mm 0,4 ÷ 0,6
19
922 3 51 V
43 4 161 N
43 4 143 L
44 4 361 G
44 3 016 R
L1
P1
M
S1
L
P
44 4 361 G
44 3 016 R
S
44 3 025 J
44 3 017 J
R
20

25 - FIGURES 22 and 23

Checking the positive restoring of the first register transmissions.

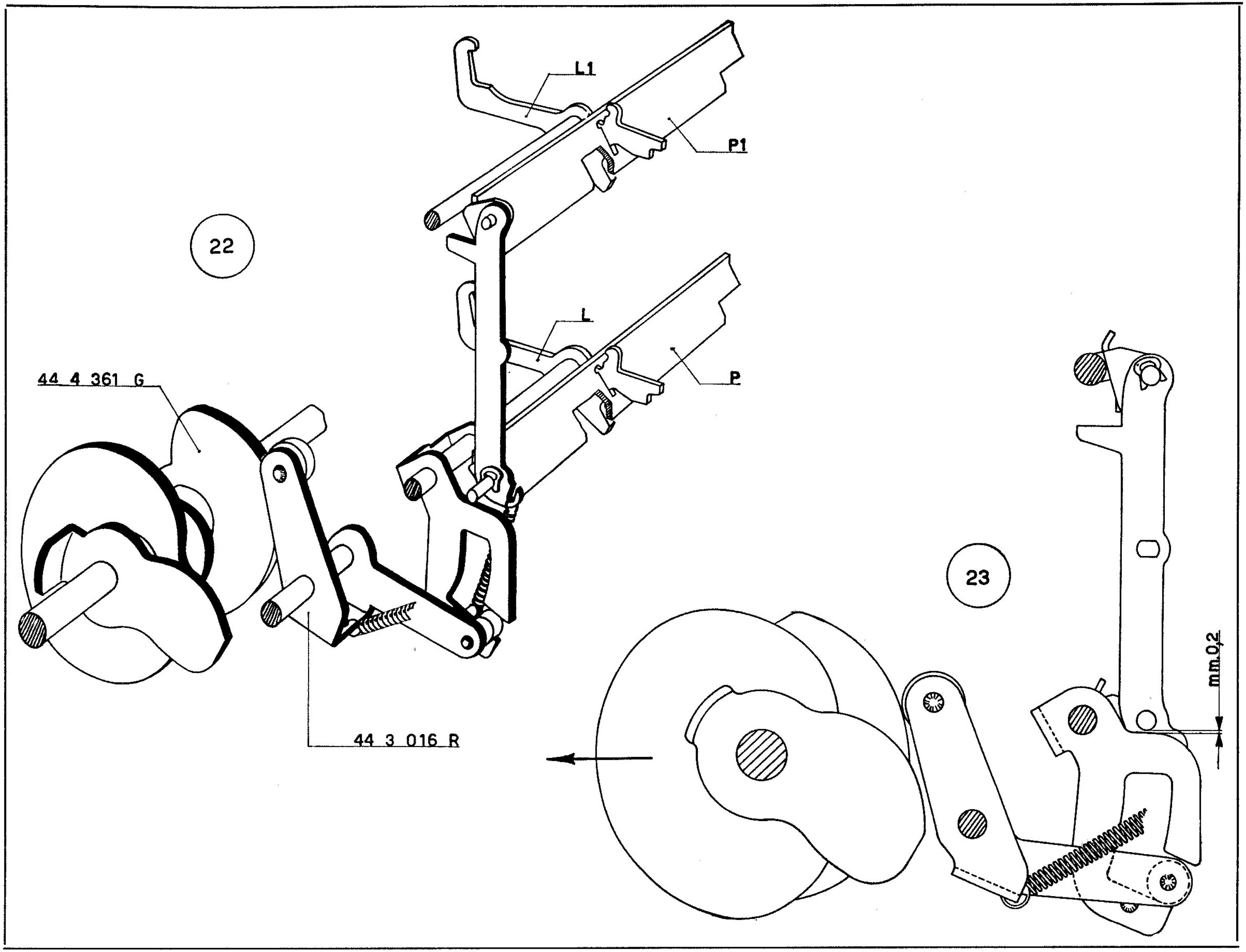
a) Rotate the main cam 44 4 361 G *to bring its circular part in contact with the roller of the crank* 44 3 016 R.

b) Check that the aligning comb **P** *is in contact with the lower extensions of the transmission levers* **L** *(figure 22).*

c) Reduce toward the rear of the machine (that is in the direction shown by the arrow) the play of the main shaft and check the reading of 0.2 *mm. shown in the figure* 23.

Act if necessary on the crank 44 3 016 R *varying the opening of its two arms.*

44 3 016 R	Alinging and shifting control crank
44 4 361 G	Main cam


L1
P1
22
L
P
44 4 361 G
44 3 016 R
23
mm.0,2

26 - FIGURE 24

Assembling the small stabilizing plate and the first register stabilizer.

a) At the rear end of the left register carrying plate 44 4 103 X hook the spring 68 0 412 V.

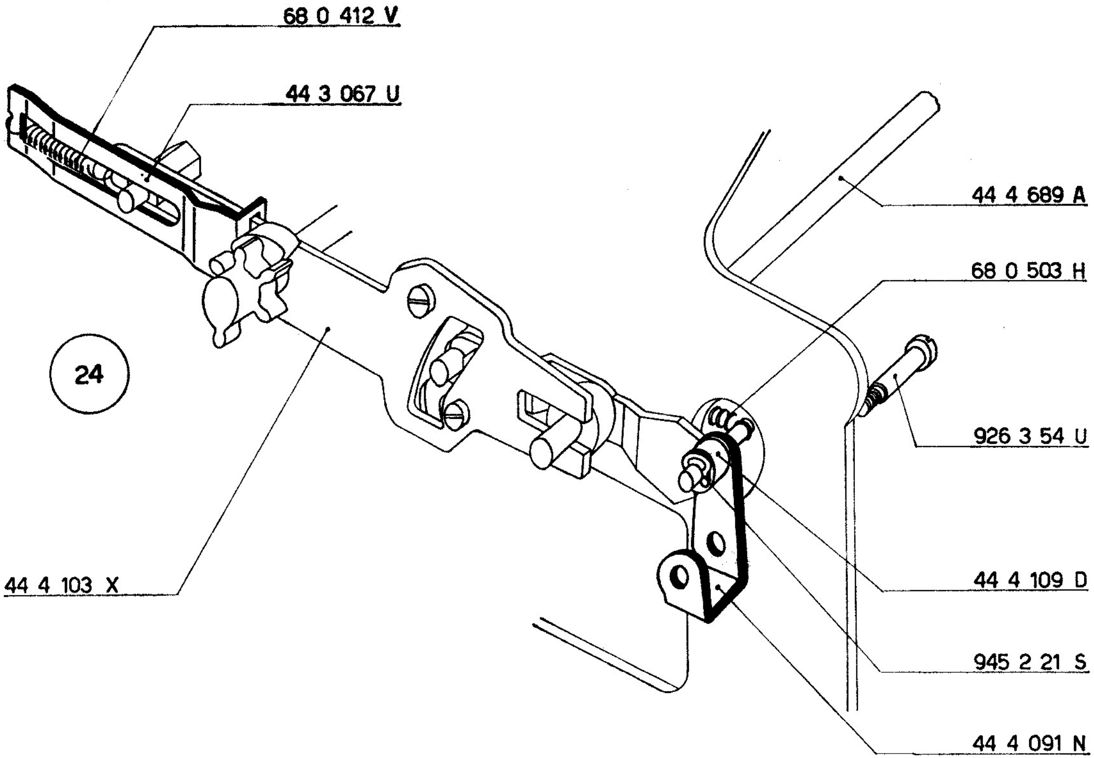
b) Place on this plate 44 4 103 X the stabilizing plate 44 3 067 U; hook the spring 68 0 412 V to it.

c) On the stabilizer 44 4 091 N assemble the roller 44 4 109 D securing it with a spring clip 945 2 21 S.

d) Assemble temporarily on the left side-plate of the machine the stabilizer 44 4 091 N by means of the stud pivot 926 3 54 U.

e) Hook to the stabilizer pivot the spring 68 0 503 H already fitted on the shaft of the 44 4 689 A.

44 3 067 U	Registers stabilizing plate
44 4 091 N	Registers stabilizer
44 4 103 X	Registers carrying plate
44 4 109 D	Registers stabilizing roller
44 4 689 A	Shaft with right lever of the register engagement and disengagement control frame
68 0 412 V	Spring for 44 3 067 U
68 0 503 H	Spring for 44 4 091 N
926 3 54 U	Temporary screw for 44 4 091 N
945 2 21 S	Spring clip for 44 4 109 D


68 0 412 V
44 3 067 U
44 4 689 A
68 0 503 H
926 3 54 U
44 4 103 X
44 4 109 D
945 2 21 S
44 4 091 N

24

27 - FIGURES 25 and 26

Adjusting the first register engagement.

The register should engage with the racks and with the transmission sectors.

a) When the register is engaged with the racks (figure 25) these latters must slide perfectly. This means that between the top of the teeth of the racks and the bottom of the teeth of the wheels there is a little clearance **L**. *In the same time we have obtained a sufficient removal of the small locking bar from the register wheels (clearance* **L1**). *By pushing the register a little toward the rack we must idle them sliding slightly.*

b) When the register engages with the transmission sectors, the first right wheel must not cause the bridge **P** *of the circular transmission moving angularly (figure 26).*

Act if necessary on the bridge.

c) Rotate the 13th wheel until the transfer tooth is above the extension of the circular transmission bridge; make the 12th transmission lever trip and engage the register with the transmission sectors. By lowering the 13th transmission sector, the 13th wheel must rotate by 0.1÷0.2 mm. before the circular transmission bridge is controlled.

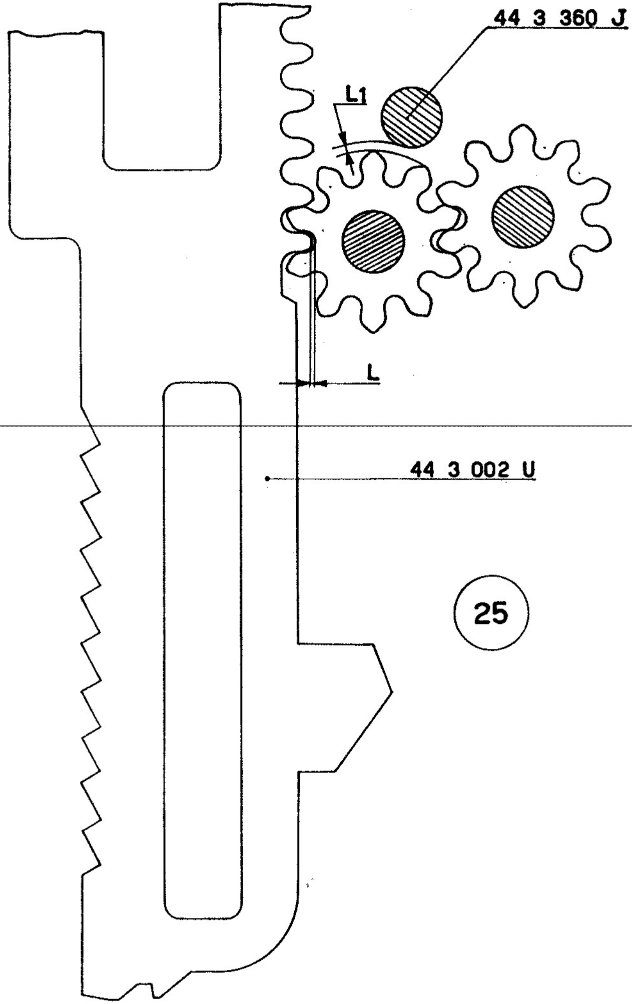
d) To control the engagement of the register with the transmission sectors do the following test:

— move the racks to zero

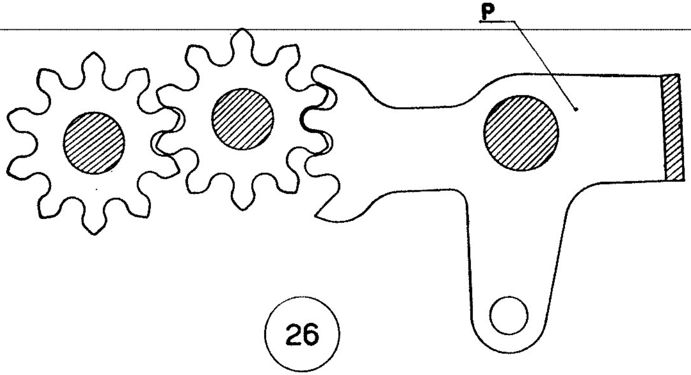
— engage the register with the racks and make them go up to move the register to zero

— engage the register with the racks; lower the first right numeral rack by one step at least. With the rack in this position disengage the register and re-engage it immediately with the transmission sectors

— rotate slowly the crank 443016R (figure 20) until the upper control comb of the transmission sectors has not completed its rotation. Reduce a little the play of the first wheel toward the rear and carry on rotating the crank seeing that, thanks to the aligning lower frame, the top of the teeth of the first right wheel makes a rotation of 0.6÷0.7 mm.


44 3 360 J
L1
L
44 3 002 U

㉕



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Check also that the flexible joint of the aligning frame control doesn't work during this operation. If the rotation of the first wheel actuated by the aligning frame is greater than 0.7 mm. the engagement of the register is too short; if the flexible joint works and the aligning frame hardly align the wheels, the register is too much engaged.

The engagement conditions will be checked with the register in adding and subtracting position.

The prescribed engagement conditions with the racks and with the transmission sectors are generally obtained if the cams 44 4 419 T have been secured to the proper plates 44 4 103 X as described at paragraph 15. If the required conditions are not obtained it is necessary to adjust the position of the cams.

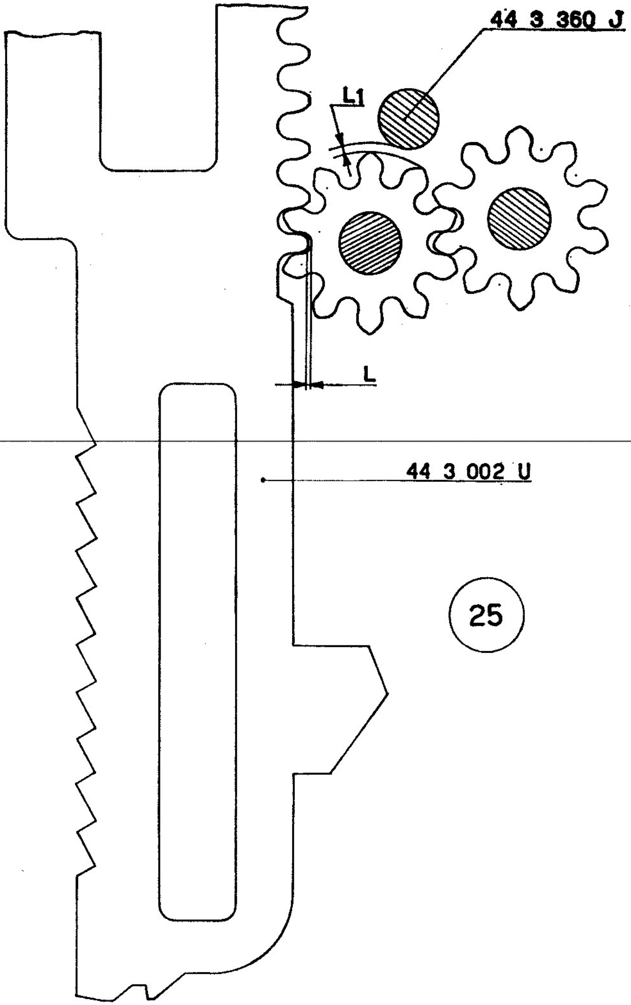
N.B. — When the machine is completely assembled the test of the register engagement with the racks should be made as described at point a).

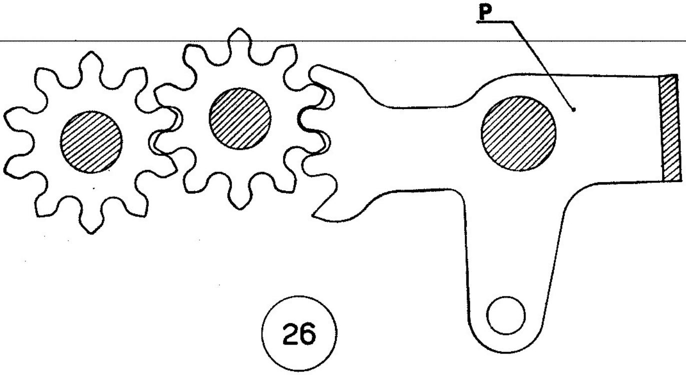
The test concerning the register engagement with the transmission sectors should be made as follows:

— clear the register
— enter a digit and add it
— clear the register
— remove the motor plug
— enter « 1 » and depress the subtraction key
— rotate slowly the main shaft and check what as been described at point d), that is: the first register right wheel must rotate actuated by the aligning frame, by 0.6÷0.7 mm. without the flexible joint starts working
— complete the cycle of the main shaft
— enter « 2 » and depress the add key
— check what has been said above.

44 3 002 U   Rack

44 3 360 J   Locking bar


44 3 360 J
L1
L
44 3 002 U
25


P
26

28 - FIGURE 27

Assembling the second register engagement and disengagement frame.

a) Place the washer 940 5 19 C on the shaft of the lever 44 4 689 A.

b) In the proper guide hole of the right internal side-plate of the machine insert the shaft of the lever 44 4 689 A on which you shall place the spring 68 0 503 H. Then place the shaft in the corresponding guide hole of the left internal side-plate.

c) Assemble the register carrying plate 44 4 103 X as illustrated in the figure and stop the shaft of the 44 4 689 A by means of a spring clip 945 3 41 A.

d) Place on the end of the shaft of the 44 4 689 A the lever 44 4 088 T with the two screws 922 3 02 V. *Adjust the axial position of the lever 44 4 088 T to leave to the shaft a play of 0.2 mm.* Tighten but not right home one of the two screws 922 3 02 V.

29 - FIGURE 28

Assembling the second register.

a) In the central hole of the second register left side-plate insert the proper pivot 44 3 063 Y on which should be placed the left register carrying plate 44 4 103 X.

Secure the pivot by tightening the screw.

b) Assemble between the side-plates of the machine the second register; see that:

— the right pivot 44 3 065 S is inserted in the guide hole of the right register carrying plate 44 4 103 X

— the left register carrying plate 44 4 103 X is placed on the shaft 44 3 009 B and on the shaft of the lever 44 4 689 A

— the pivot **P** of the lever 44 4 088 T is inserted in the slot of the cam secured on the left plate 44 4 103 X.

c) Secure the right pivot of the register 44 3 065 S by means of a spring clip 945 2 51 G.

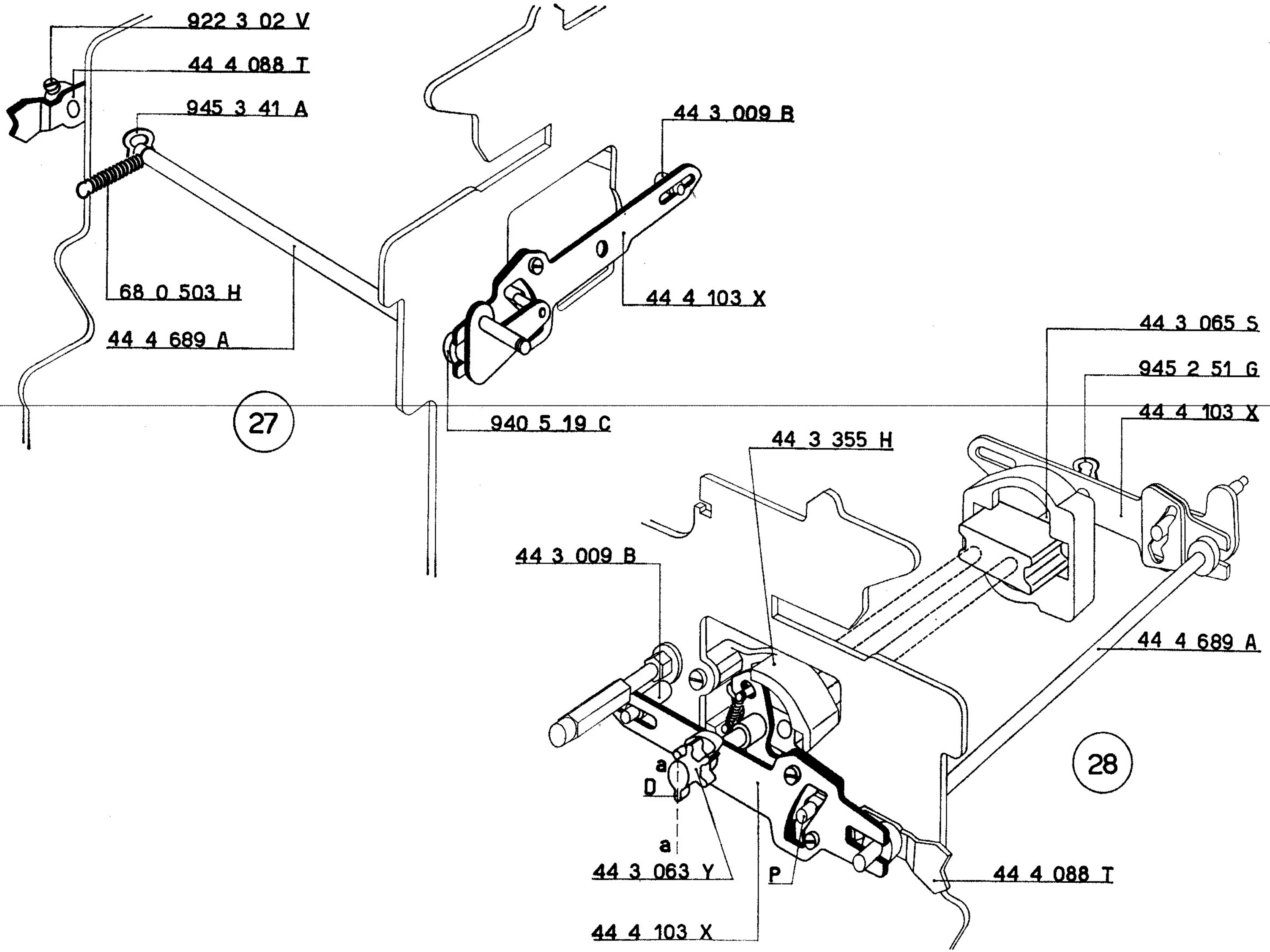
d) Center temporarily the register with respect to the racks and reduce to a minimum its axial play. Both conditions are obtained by moving suitably the two pivots 44 3 063 Y and 44 3 065 S. Once the prescribed conditions obtained tighten but not right home the screws securing the two pivots.

30 - FIGURE 28

Adjusting the register guide and stop block and the second register engagement and disengagement control frame.

Follow the instructions described in the paragraph 19 concerning the first register.

44 3 009 B	Racks stop upper shaft
44 3 063 Y	Register left pivot
44 3 065 S	Register right pivot
44 3 355 H	Register guide and stop block
44 4 088 T	Left lever of the register engagement and disengagement control frame
44 4 103 X	Register carrying plate
44 4 689 A	Shaft with right lever of the register engagement and disengagement control frame
68 0 503 H	Spring
922 3 02 V	Securing screw for 44 4 088 T
940 5 19 C	Washer for 44 4 689 A
945 2 51 G	Spring clip for 44 3 065 S
945 3 41 A	Spring clip for 44 4 689 A


922 3 02 V
44 4 088 T
945 3 41 A
44 3 009 B
68 0 503 H
44 4 103 X
44 4 689 A
940 5 19 C
27
44 3 065 S
945 2 51 G
44 4 103 X
44 3 355 H
44 3 009 B
44 4 689 A
a
D
a
44 3 063 Y
P
44 4 088 T
44 4 103 X
28

31 - Last adjustment of the axial position of the second register and proper transmission sectors unit.

Follow the instructions described at paragraphs 20 *and* 21 *concerning the first register.*

32 - Adjusting the second register transmission control

(see figure 20).

a) Adjust the axial position of the crank **M** *so that the small connecting-rod* 44 3 025 J *is perfectly vertical.*

Tighten but not right home the screw of the crank **M.**

b) Adjust the position of the comb **P1** *by following the instructions given at paragraph* 24.

c) Tighten the screw of the crank **M.**

d) Disassemble the main shaft and cam.

44 3 067 U	Register stabilizing plate
44 4 091 N	Register stabilizer
44 4 103 X	Register carrying plate
44 4 109 D	Roller for registers stabilizer
44 4 689 A	Shaft with right lever of the register engagement and disengagement control frame

33 - FIGURE 29

Assembling the small stabilizing plate and the second register stabilizer.

a) Hook the spring 68 0 412 V to the rear end of the register carrying plate 44 4 103 X.

b) On the same plate 44 4 103 X place the small stabilizing plate 44 3 067 U; hook the spring 68 0 412 V to it.

c) On the stabilizer 44 4 091 N assemble the roller 44 4 109 D which must be secured by means of a spring clip 945 2 21 S.

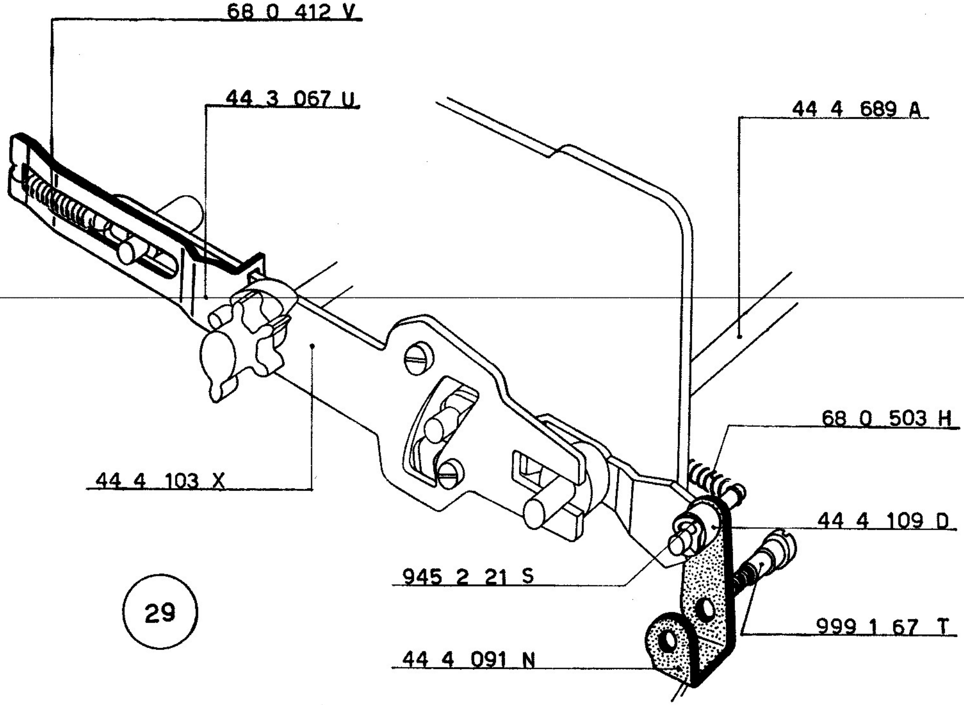
d) Assemble temporarily on the left side-plate of the machine, by means of the stud-screw 99 1 67 T, the stabilizer 44 4 091 N.

e) Hook the spring 68 0 503 H already assembled on the shaft 44 4 689 A to the stabilizer pivot.

34 - Adjusting the second register engagement.

Follow the instructions given at paragraph 27 *concerning the first register.*

68 0 412 V	Spring for 44 3 067 U
68 0 503 H	Spring for 44 4 091 N
945 2 21 S	Spring clip for 44 4 109 D
999 1 67 T	Stud-screw for 44 4 091 N


68 0 412 V
44 3 067 U
44 4 689 A
68 0 503 H
44 4 103 X
44 4 109 D
945 2 21 S
999 1 67 T
44 4 091 N

29

35 - FIGURE 30

Assembling the register inversion control plate.

On the left side-plate of the machine assemble the control plate 44 4 113 Q which must be guided:

— at the front by the shafts of the levers 44 4 689 A

— at the rear by the roller 40 7 041 X.

36 - FIGURE 30

Assembling of the type sliders restoring plates.

a) On the left side-plate of the machine assemble the type sliders restoring plate 44 7 684 Y; its pivot **P** should be fitted in the guide slot made on the same side-plate.

By following the same instructions assemble the plate 44 7 685 Z on the right side-plate of the machine.

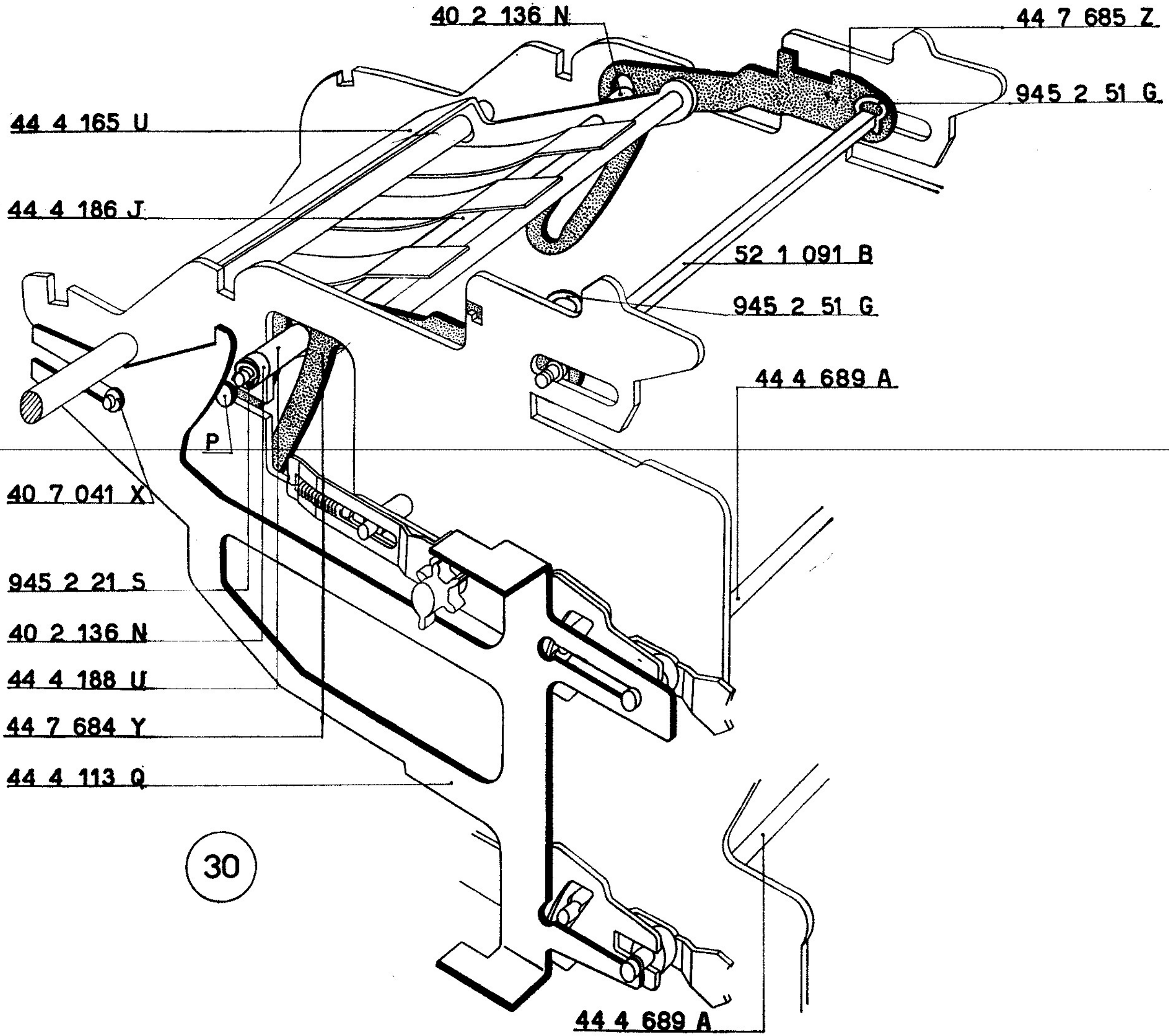
b) Connect the two plates by means of the small bar 52 1 091 B which must be placed in the guide slots made in the two side-plates of the machine. Secure the small bar by means of two spring clips 945 2 51 G.

c) In the guide holes of the two arms of the bridge 44 4 165 U place the shaft 44 4 186 J. The chamfered longer end should be turned leftward. To the left of the shaft assemble the rollers 44 4 188 U and 40 2 136 N securing them with a spring clip 945 2 21 S. To the right of the shaft assemble the roller 40 2 136 N securing it with a spring clip 945 2 21 S.

The rollers must be fitted in the proper slots of the two type sliders restoring plates 44 7 684 Y and 44 7 685 Z.

44 4 113 Q	Register inversion control plate
44 4 165 U	Racks universal bar bridge
44 4 186 J	Type sliders restoring plate rollers carrying shaft
44 4 188 U	Type sliders restoring left plate roller
44 4 689 A	Shaft with right lever of the registers engagement and disengagement control frame

44 7 684 Y	Type sliders restoring left plate
44 7 685 Z	Type sliders right plate
40 2 136 N	Roller for 44 4 186 J
40 7 041 X	Roller for 44 4 113 Q
52 1 091 B	Printing sliders restoring bar
945 2 21 S	Spring clip
945 2 51 G	Spring clip


40 2 136 N
44 7 685 Z
945 2 51 G
44 4 165 U
44 4 186 J
52 1 091 B
945 2 51 G
44 4 689 A
P
40 7 041 X
945 2 21 S
40 2 136 N
44 4 188 U
44 7 684 Y
44 4 113 Q
30
44 4 689 A

37 - FIGURE 31

Assembling the main shaft and cam.

Assemble the main cam and therefore the shaft 43 4 143 L. We must place on the main shaft, between the two internal side-plates of the machine:
— the racks clearing control cam 44 5 359 P with the two proper screws 922 3 51 V
— the stroke-counter frame control cam 44 5 113 R with the proper two screws 922 3 02 V.

44 4 170 D	Main connecting-rod lower crank
44 4 361 G	Main cam
44 4 463 X	Main connecting-rod
44 4 464 Y	Main connecting-rod upper crank
44 5 113 R	Stroke-counter frames control cam
44 5 359 P	Racks clearing control cam

38 - FIGURE 31

Assembling the main connecting-rod.

a) On the main connecting-rod lower crank 44 4 170 D place the roller 43 4 154 P which thicker ring must be turned toward the inside of the machine.

b) On the racks arm shaft place the crank 44 4 464 Y with the proper screws 922 3 51 V and 43 4 161 N.

c) Connect the crank 44 4 464 Y to the crank 44 4 170 D by means of the main shaft 44 4 463 X. Secure it by means of two spring clips 945 3 41 A.

43 4 143 L	Main shaft
43 4 154 P	Roller for 44 4 170 D
43 4 161 N	Perforating screw for 44 4 464 Y
922 3 02 V	Securing screw for 44 5 113 R
922 3 51 V	Securing screw for 44 4 464 Y and 44 5 359 P
945 3 41 A	Spring clip

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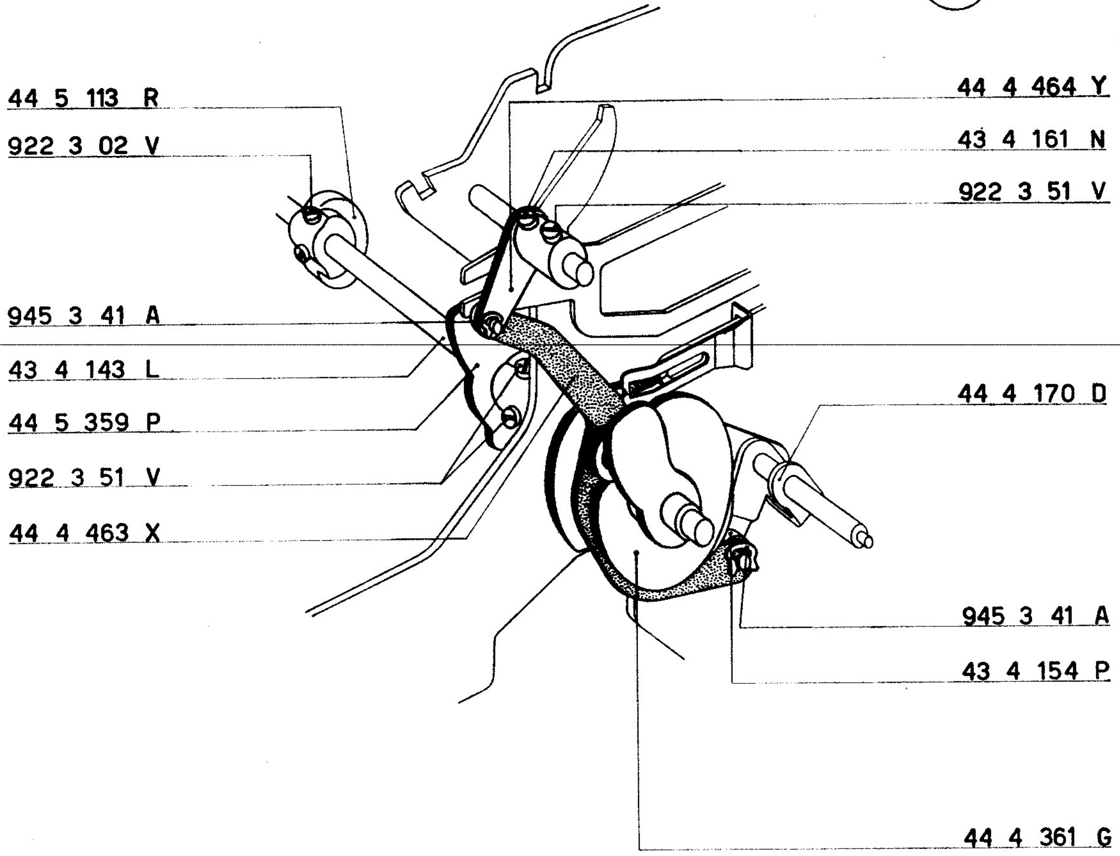
44 5 113 R
922 3 02 V
945 3 41 A
43 4 143 L
44 5 359 P
922 3 51 V
44 4 463 X
44 4 464 Y
43 4 161 N
922 3 51 V
44 4 170 D
945 3 41 A
43 4 154 P
44 4 361 G

39 - FIGURE 32

Assembling the back-spacing tooth.

a) In the proper guide seats of the internal side-plate of the machine place correctly orientated the back-spacing tooth 43 2 082 H.

b) Hook the spring 00 0 182 Z to the tooth.

40 - FIGURES 33 and 34

Preparing the left external side-plate.

a) Assemble on the left external side-plate 44 1 302 B:
— the shock-absorber block 44 2 085 N by means of the pivot 44 2 086 P and two spring clips 945 2 21 S (figure 33).

44 1 302 B	Left external side-plate
44 2 085 N	Shock-absorber block
44 2 086 P	Shock-absorber block pivot
00 0 182 Z	Spring for 43 2 082 H
43 2 082 H	Back-spacing tooth
945 2 21 S	Spring clip

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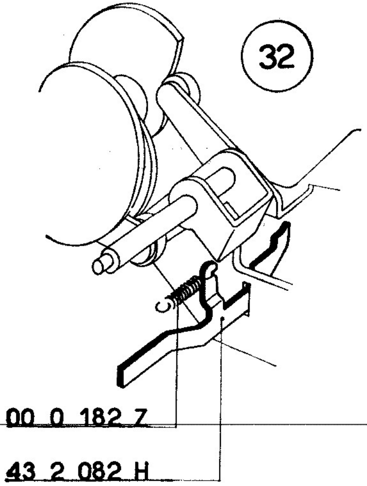
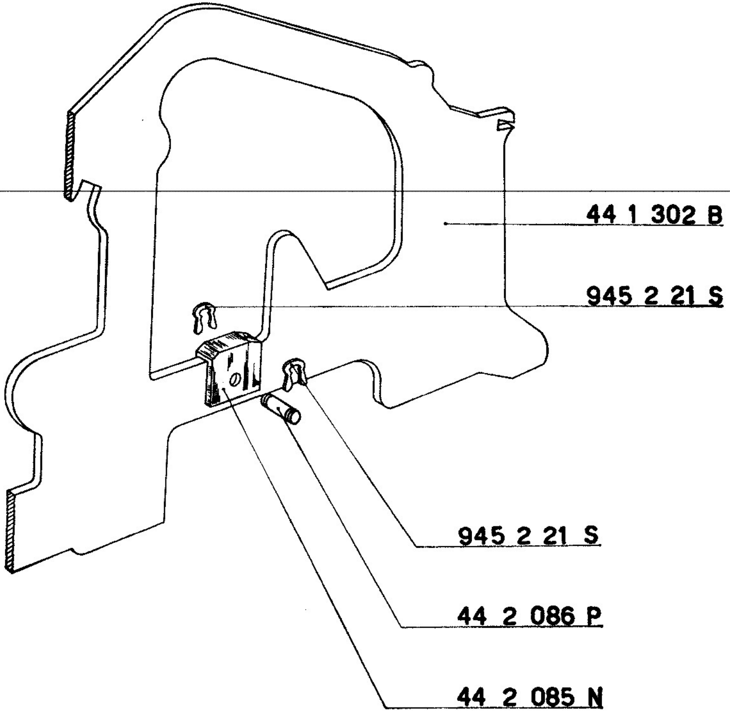

00 0 182 Z
43 2 082 H

㉝


44 1 302 B
945 2 21 S
945 2 21 S
44 2 086 P
44 2 085 N

— the division connecting-rod guide ring 44 6 035 P by means of the nut 938 7 01 D
— the memory engagement connecting-rod guide pivot 44 6 054 S by means of the nut 938 3 05 G.

b) On the same side-plate assemble the pivot 40 5 035 P with the nut 938 3 05 G which must not be tightened right home.

c) Assemble by means of the pivots 44 5 100 H and 52 2 064 Q the repeat control bridge 44 2 082 K and the negative multiplication servomechanism hook 44 5 091 P.

41 - FIGURE 34

Assembling the left external side-plate and the transmission bridge control lever.

a) On the transmission bridge control lever 44 2 364 H place the roller 40 7 101 Z securing it with a spring clip 945 2 51 G.

b) Assemble the left external side-plate 44 1 302 B and the transmission bridge control lever 44 2 364 H. This latter must be pivoted on the shaft 44 4 172 T and take the position illustrated in the figure.

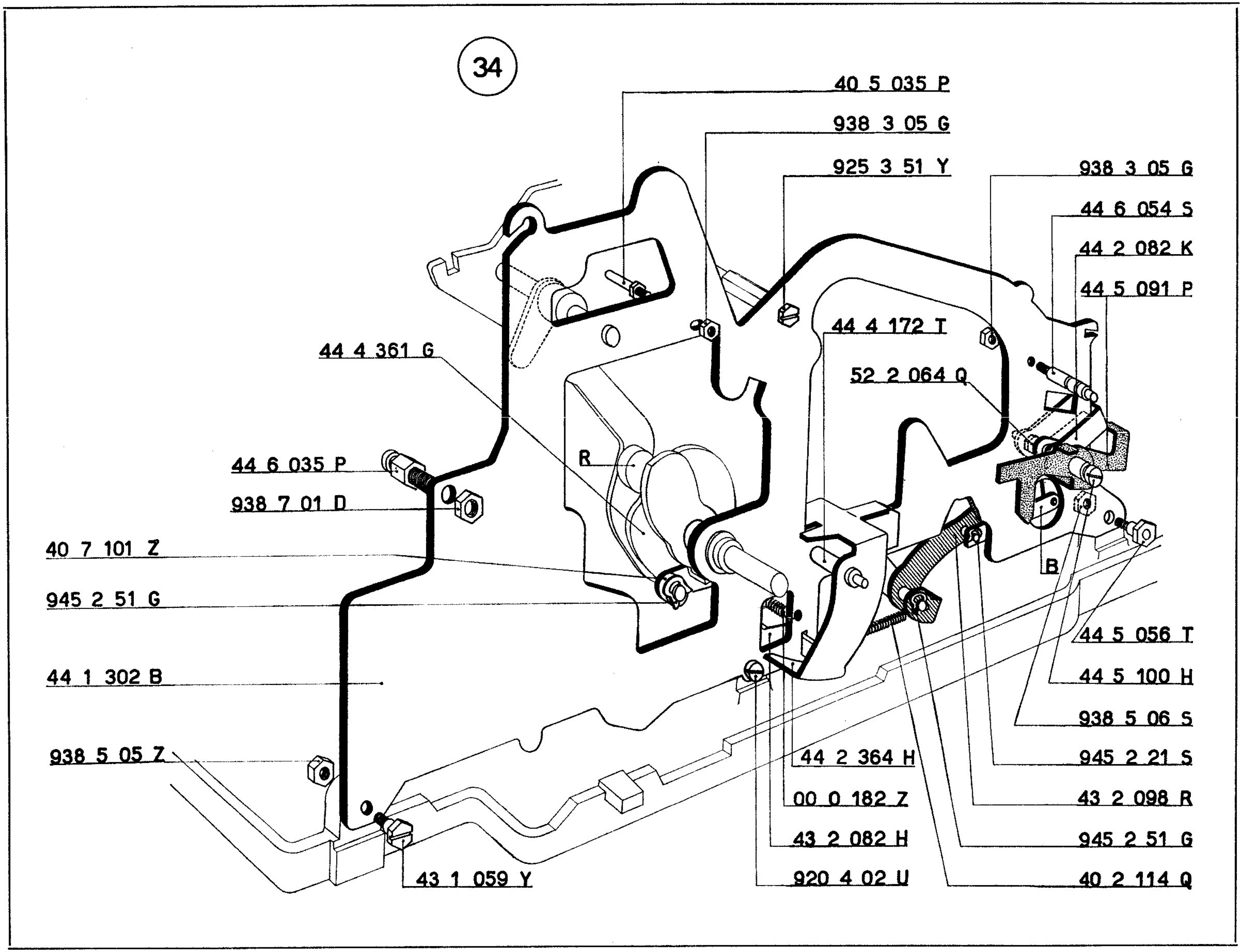
c) Secure the side-plate 44 1 302 B to the base of the machine by means of:
— the screw 43 1 059 Y and the nut 938 5 05 Z
— the screw 920 4 02 U
— the special pin-screw 44 5 056 T and nut 938 5 06 S
— the screw 925 3 51 Y.

d) On the lever 44 2 364 H assemble the slide transmission rod 43 2 098 R securing it with a clip 945 2 51 G. Connect the rod to the small connecting-rod **B** of the bridge 44 2 082 K and secure by means of a spring clip 945 2 21 S.

e) Hook the spring 00 0 182 Z of the tooth 43 2 082 H to the left external side-plate of the machine.

f) Hook the spring 40 2 114 Q (already hooked to the special spring-carrying pin-screw) to the rod 43 2 098 R.

44 1 302 B	Left external side-plate
44 2 082 K	Repeat control bridge
44 2 364 H	Transmission bridge control lever
44 4 172 T	Lower crank shaft
44 4 361 G	Main cam
44 5 056 T	Special pin-screw
44 5 091 P	Negative multiplication servomechanism hook
44 5 100 P	Special pivot for 44 5 091 P
44 6 035 P	Division connecting-rod guide ring
44 6 054 S	Memory engagement connecting-rod guide pivot
00 0 182 Z	Spring for 43 2 082 H
40 2 114 Q	Spring for 43 2 098 R
40 5 035 P	Pivot
43 1 059 Y	Set-screw for side-plates
43 2 082 H	Back-spacing tooth
43 2 098 R	Slide transmission rod
52 2 064 Q	Securing pivot for 44 2 082 H
920 4 02 U	Set-screw for side-plate
925 3 51 Y	Set-screw for side-plate
938 3 05 G	Nut for 44 6 054 S and 40 5 035 P
938 5 05 Z	Nut for 43 1 059 Y
938 5 06 S	Nut for 44 5 056 T
938 7 01 D	Nut for 44 6 035 P
945 2 21 S	Spring clip
945 2 51 G	Spring clip


34
40 5 035 P
938 3 05 G
925 3 51 Y
938 3 05 G
44 6 054 S
44 2 082 K
44 5 091 P
44 4 172 T
52 2 064 Q
44 4 361 G
R
44 6 035 P
938 7 01 D
40 7 101 Z
945 2 51 G
44 1 302 B
B
938 5 05 Z
43 1 059 Y
44 2 364 H
00 0 182 Z
43 2 082 H
920 4 02 U
44 5 056 T
44 5 100 H
938 5 06 S
945 2 21 S
43 2 098 R
945 2 51 G
40 2 114 Q

42 - FIGURE 35

Adjusting temporarily the racks clearing control cam and the stroke-counter frames control cam.

a) Adjust the axial position of the shaft 43 4 143 L *so that it projects by* 19 *mm. from the guide ring of the left external side-plate. In these conditions, move the cam* 44 5 359 P *near the left internal side-face and tighten but not right home the screws of the cam.*

b) Rotate the shaft 43 4 143 L *so that the cam* 44 5 359 P *takes the angular position shown in the figure (upper screw perfectly vertical). In these conditions move the main cam* 44 4 361 G *to the rest position that is in contact with the roller* **R** *of the lever* 44 2 364 H. *The axial position of the cam must be such that its profil is displaced a little from the screw* 925 3 06 U *which secures the comb* 44 3 014 P. *Tighten the screws of the main cam.*

c) By holding the cams in these positions, move the cam 44 5 113 R 2 *mm. from the right internal side-plate of the machine. The angular position is illustrated in the figure (upper screw rotated by* 15° *about with respect to the vertical). Tighten but not right home the screws of the cam.*

43 - FIGURE 36

Adjusting the calculation racks universal bar.

a) Move axially the crank 44 4 464 Y *which must be at* 15 *mm. from the left internal side-plate of the machine. In this way we obtain the centering of the roller* **R** *(of the main connecting-rod* 44 4 463 X*) with respect to the proper cam.*

b) Move the main cam 44 4 361 G *to the position illustrated in the figure (rest position) and tighten therefore but not right home the two screws of the crank* 44 4 464 Y.

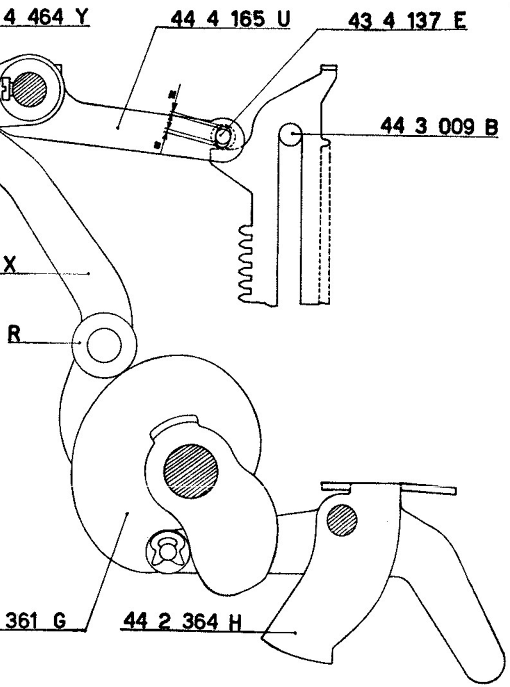
c) Rotate slowly the bridge 44 4 165 U *to lower the main racks which will be stopped by the shaft* 44 3 009 B. *Rotate still the bridge* 44 4 165 U *so that the small bar* 43 4 137 E *is in the middle of the proper guide slots of the bridge* 44 4 165 U.

Tighten the screws of the crank 44 4 464 Y *right home.*

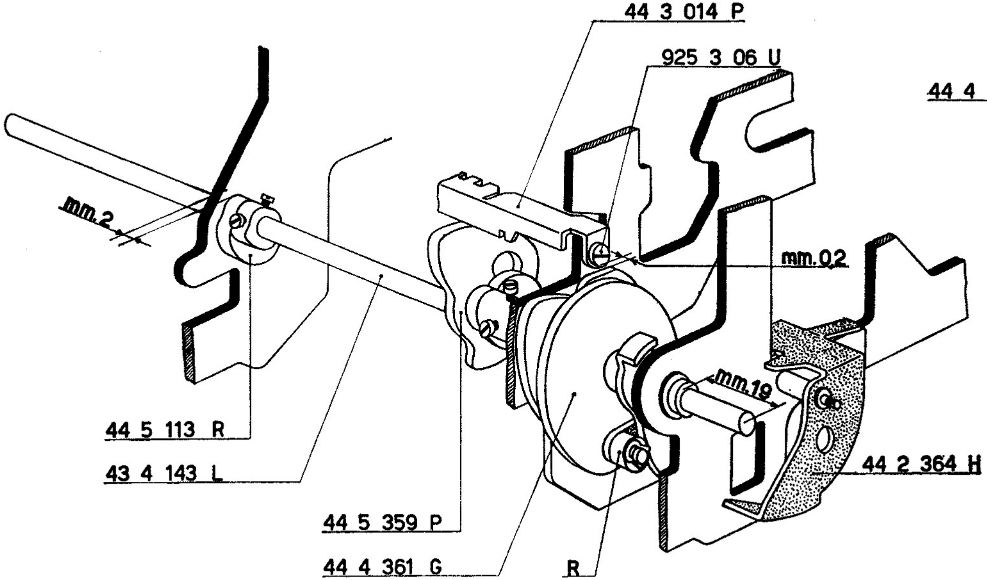
44 2 364 H	Transmission bridge control lever
44 3 009 B	Racks stop upper shaft
44 3 014 P	Racks guide rear comb
44 4 165 U	Racks universal bar bridge
44 4 361 G	Main cam
44 4 463 X	Main connecting-rod

44 4 464 Y	Main connecting-rod upper crank
44 5 113 R	Stroke-counter frames control cam
44 5 359 P	Racks clearing control cam
43 4 137 E	Main racks frame small bar
43 4 143 L	Main shaft
925 3 06 U	Screw for 44 3 014 P

36


44 4 464 Y
44 4 165 U
43 4 137 E
44 3 009 B
44 4 463 X
R
44 4 361 G
44 2 364 H

35


44 3 014 P
925 3 06 U
mm.2
mm.0,2
mm.19
44 5 113 R
43 4 143 L
44 5 359 P
44 4 361 G
R
44 2 364 H

44 - FIGURE 37

Assembling the registers engagement control plates.

a) On the right internal side-plate of the machine assemble the column 44 1 612 Z with the washer 940 3 38 N.

b) Between the internal side-plates of the machine assemble correctly orientated, the shaft 44 3 022 P securing it with two spring clips 945 2 51 G.

c) Between the register engagement control plate (on the transmissions unit) 52 1 194 F and the proper rocker hook the spring 68 1 104 W.

d) Between the register engagement control plate (on the racks) 52 1 196 H and the rocker hook the spring 68 1 104 W. Hook the spring 40 3 021 P to the same plate.

e) Assemble the two plates 52 1 194 F and 52 1 196 H as illustrated in the figure. At the rear they should be guided by the column 44 4 084 P which is secured on the side-plate of the machine by means of the nut 938 3 51 D. *Check that the plates slide well;* hoot the spring 40 3 021 P to the plate 52 1 194 F.

45 - FIGURES 37 and 38

Assembling and adjusting the cam 44 4 382 W.

a) On the main shaft of the machine assemble the cam 44 4 382 W with the proper two screws 922 3 01 U (figure 37).

b) Adjust the axial position of the cam which should be at 2 mm. from the side-plate, when the cam 44 5 359 P is against the left internal side-plate of the machine.

c) Move the main cam to rest position; adjust the angular position of the cam 44 4 382 W which should be that illustrated in the figure 38. Tighten the two screws of the cam.

46 - FIGURE 37

Preparing the helicoidal wheel of the main shaft.

a) Place successively on the hub of the clutch wheel 43 4 745 X:

— the helicoidal wheel of the main shaft 43 4 144 M
— the cam 44 4 178 H (correctly orientated)
— the clutch leaf spring 44 4 477 V.

b) Screw therefore on the hub of the 43 4 745 X the nut 44 4 479 F.

47 - FIGURE 37

Assembling the printing cam, the helicoidal wheel unit and the disc 43 4 450 U.

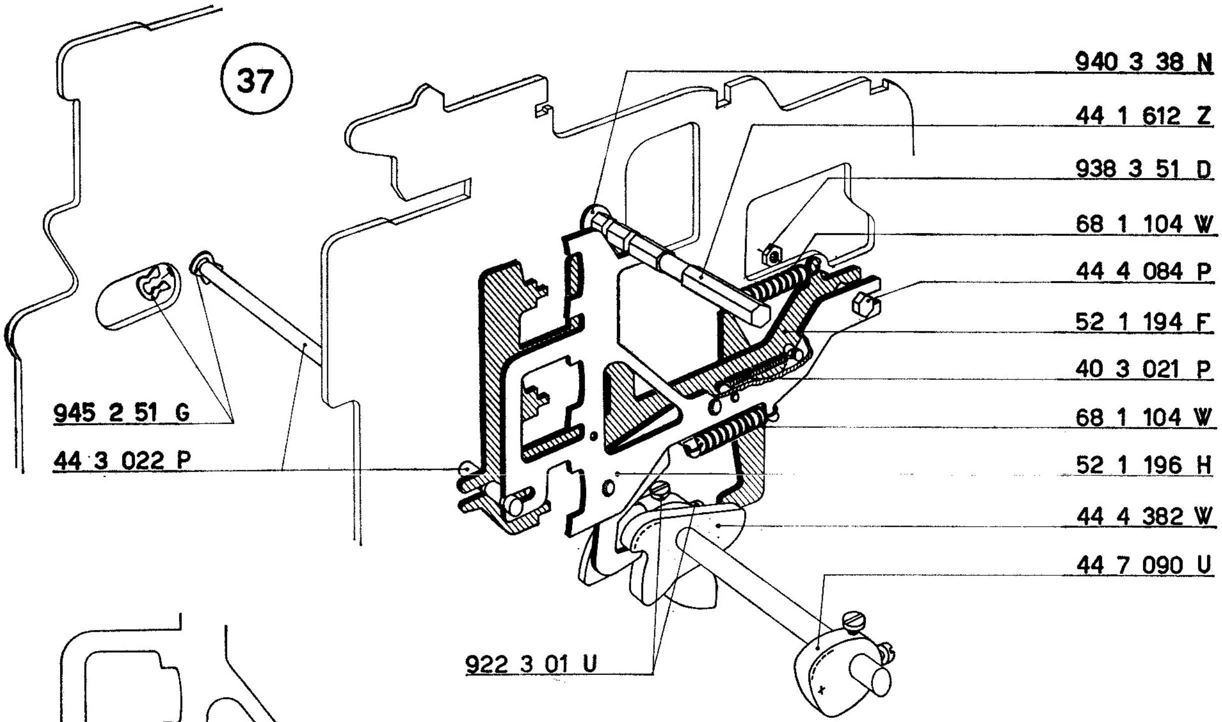
Place successively on the main shaft:

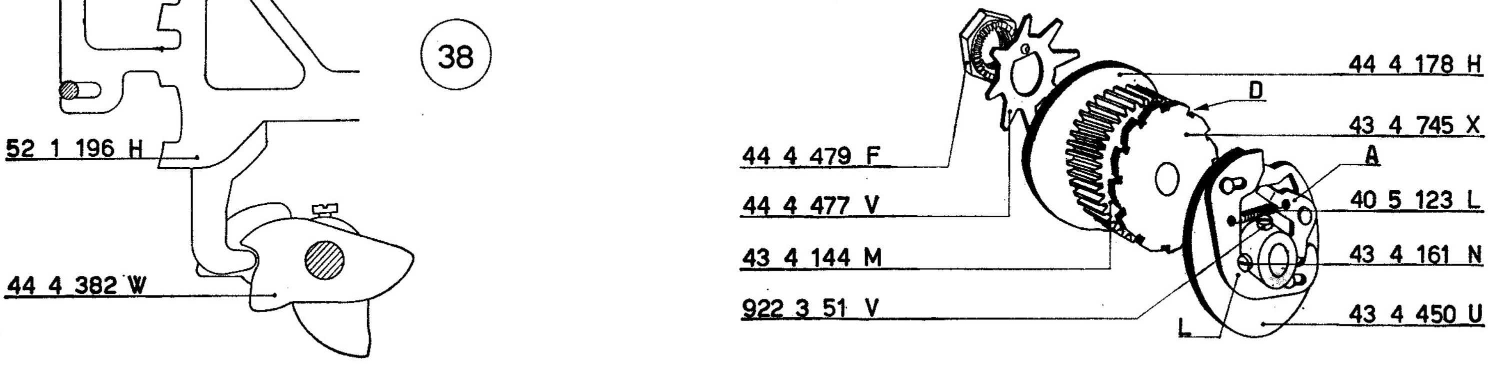
— the printing cam 44 7 090 U. The asterisk marked on it must be turned toward the outside of the machine. Move the cam to contact a little the 44 4 382 W and adjust temporarily its angular position so that the profiles (hachured in the figure) mesh perfectly. Tighten but not right home the screws of the cam:

— the helicoidal wheel unit prepared at paragraph 46

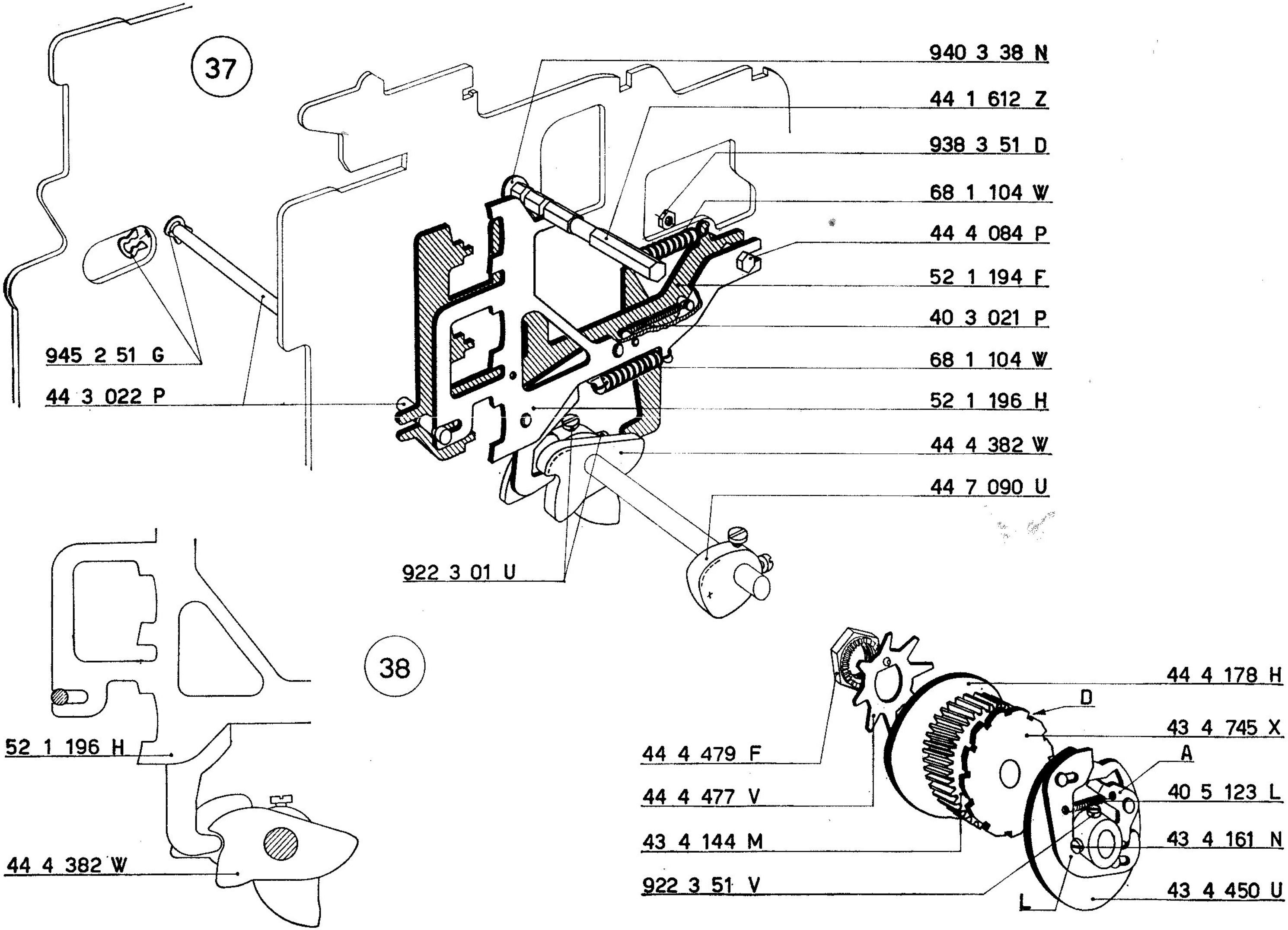
— the disc with starting plate and dragging tooth 43 4 450 U with the proper screws 922 3 51 V and 43 4 161 N.

Hooked the spring 40 5 123 L; between the lever **L** and the stop **A** of the disc 43 4 450 U; the bent of the stop **A** must be located in one of the openings **D** of the clutch wheel.


37
940 3 38 N
44 1 612 Z
938 3 51 D
68 1 104 W
44 4 084 P
52 1 194 F
40 3 021 P
68 1 104 W
52 1 196 H
44 4 382 W
44 7 090 U
945 2 51 G
44 3 022 P
922 3 01 U


38
52 1 196 H
44 4 382 W
44 4 178 H
D
43 4 745 X
A
40 5 123 L
43 4 161 N
43 4 450 U
L
44 4 479 F
44 4 477 V
43 4 144 M
922 3 51 V

44 1 612 Z	Side-plates connection right column
44 3 022 P	Guide shaft for plates 52 1 194 F and 52 1 196 H
44 4 084 P	Guide column for plates 52 1 194 F and 52 1 196 H
44 4 178 H	Forward cam for 44 4 105 Z
44 4 382 W	Control cam for plates 52 1 194 F and 52 1 196 H
44 4 477 V	Clutch leaf spring
44 4 479 F	Clutch nut
44 7 090 U	Printing cam
40 3 021 P	Spring for 52 1 194 F and 52 1 196 H
40 5 123 L	Spring for 43 4 450 U
43 4 161 N	Perforating screw for 43 4 450 U
43 4 450 U	Disc with starting plate and dragging tooth
43 4 745 X	Clutch wheel with hub
52 1 194 F	Registers engagement control plate (on transmissions unit)
52 1 196 H	Registers engagement control plate (on racks)
68 1 104 W	Spring for 52 1 194 F and 52 1 196 H
922 3 01 U	Securing screws for 44 4 382 W
922 3 51 V	Securing screws for 43 4 450 U
938 3 51 D	Nut for 44 4 084 P
940 3 38 N	Washer for 44 1 612 Z
945 2 51 G	Spring clip for 44 3 022 P


37
940 3 38 N
44 1 612 Z
938 3 51 D
68 1 104 W
44 4 084 P
52 1 194 F
40 3 021 P
68 1 104 W
52 1 196 H
44 4 382 W
44 7 090 U
945 2 51 G
44 3 022 P
922 3 01 U
38
52 1 196 H
44 4 382 W
44 4 178 H
D
43 4 745 X
A
40 5 123 L
43 4 161 N
43 4 450 U
L
44 4 479 F
44 4 477 V
43 4 144 M
922 3 51 V

48 - FIGURE 39

Preparing and assembling the signs bridge unit.

a) Take the shaft 44 7 099 Z and hold it by the end where there are two seats for spring clips. Place on this shaft successively:

— the first register special signs selecting bridge 44 7 093 K

— the second register special signs selecting bridge 44 7 095 M

— the second register signs slider control bridge 44 7 097 P

— the first register signs slider control bridge 44 6 096 N.

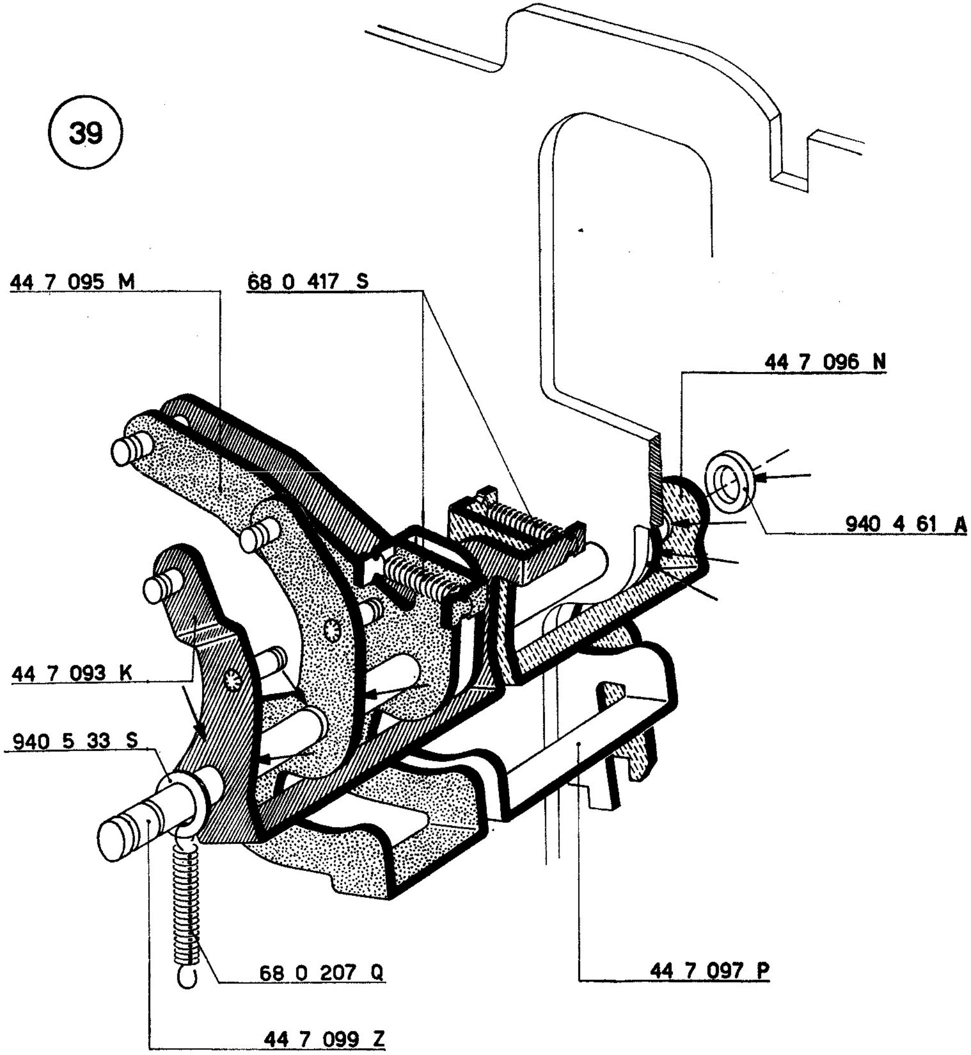
b) Assemble this unit now prepared on the right internal side-plate of the machine. The bridges should take the position illustrated in the figure.

c) Hook the spring 68 0 417 S between the bridges 44 7 095 M and 44 7 097 P.

d) Hook the spring 68 0 417 S between the bridges 44 7 096 N and 44 7 093 K.

e) On the shaft 44 7 099 Z place the washer 940 5 33 S with the correct spring 68 0 207 Q.

44 7 093 K	First register special signs selecting bridge
44 7 095 M	Second register special signs selecting bridge
44 7 096 N	First register signs slider control bridge
44 7 097 P	Second register signs slider control bridge
44 7 099 Z	Signs control bridges shaft
68 0 207 Q	Spring
68 0 417 S	Spring for 44 7 096 N - 44 7 093 K - 44 7 095 M and 44 7 097 P
940 4 61 A	Washer for 44 7 099 Z
940 5 33 S	Washer


39
44 7 095 M
68 0 417 S
44 7 096 N
940 4 61 A
44 7 093 K
940 5 33 S
68 0 207 Q
44 7 097 P
44 7 099 Z

49 - FIGURE 40

Preparing the right external side-plate.

a) Assemble on the right external side-plate 44 1 307 G the slide shaft guide right plate 44 2 055 X by means of:
— the pin-screw 44 2 058 A with the proper nut 938 3 51 D
— the screw 925 3 51 D with eccentric washer of the slide shaft 44 2 053 V.

The small plate should be moved so that the screw 925 3 51 D *is centered with respect to the hole of the small plate. The two screws must not be tightened right home.*

b) On the same side-plate assemble correctly orientated the total clutch control hook 43 4 109 T by means of the stud screw 926 3 90 V and the special nut 43 4 114 F.

c) On the above hook, assemble the slider 44 4 012 N by means of the stud screw 926 2 16 J, the washer 940 3 75 K and the nut 938 2 11 Z.

d) Between the hook and the slider, hook the spring 40 3 021 P.

e) Assemble the stabilizer 52 6 108 W by means of the eccentric stud screw 52 6 123 C and the proper nut 938 3 51 D which should not be tightened right home. *Turn temporarily the greater eccentricity up.*

44 1 307 G	Right external side-plate
44 2 053 V	Slide shaft eccentric washer
44 2 055 X	Slide shaft guide right plate
44 2 058 A	Securing pin screw for 44 2 055 X
44 4 012 N	Totals universal bar slider
40 3 021 P	Spring for 43 4 109 T - 44 4 012 N
43 4 109 T	Total clutch control hook
43 4 114 F	Special nut for 926 3 90 V

52 6 108 W	Credit balance slider stabilizer
52 6 123 C	Eccentric stud screw for 52 6 108 W
925 3 51 Y	Securing screw for 44 2 055 X
926 2 16 J	Stud screw
926 3 90 V	Stud screw
938 2 11 Z	Nut for 926 2 16 J
938 3 51 D	Nut for 44 2 058 A and for 52 6 123 C
940 3 75 K	Washer

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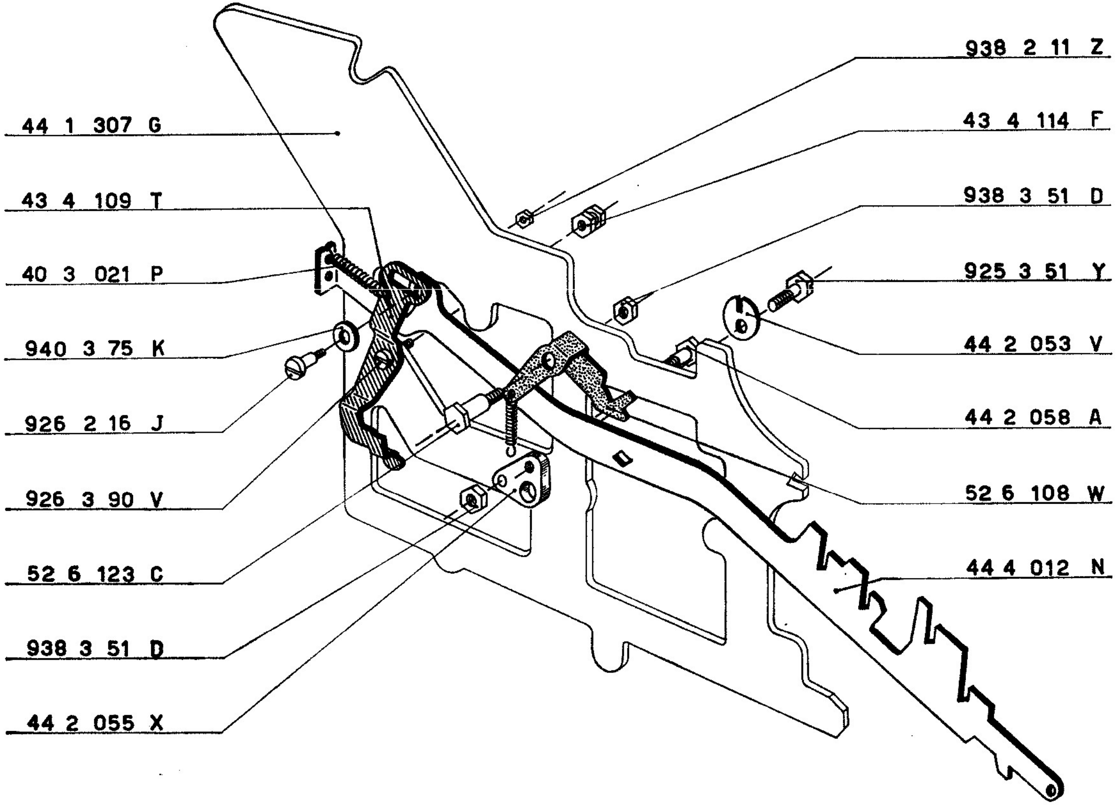

938 2 11 Z
43 4 114 F
938 3 51 D
925 3 51 Y
44 2 053 V
44 2 058 A
52 6 108 W
44 4 012 N
44 1 307 G
43 4 109 T
40 3 021 P
940 3 75 K
926 2 16 J
926 3 90 V
52 6 123 C
938 3 51 D
44 2 055 X

50 - FIGURES 41 and 42

Assembling the right external side-plate.

a) On the right external side-plate 44 1 307 G assemble by means of the shaft 44 2 071 X, the second register subtraction control selector 44 5 072 T and the starting lever 44 4 019 V.

b) Assemble this side-plate on the base of the machine seeing that:

— the main shaft, the shaft 44 4 166 V and the signs bridges shaft 44 7 099 Z are placed in the proper guide holes;

— the threaded end of the shaft 44 2 071 X is inserted in the guide hole of the right internal side-plate;

— the roller **R** of the starting lever 44 4 019 V is placed on the profile of the wheel 43 4 450 U.

c) Secure the side-plate by means of two screws 43 1 059 Y (and proper nuts 938 5 05 Z) and the screw 925 3 51 Y which must be screwed on the column 44 1 612 Z.

d) Secure the shaft 44 2 071 X by means of a nut 938 3 51 D not visible in the figure. The nut should be placed in the inside of the right internal side-plate.

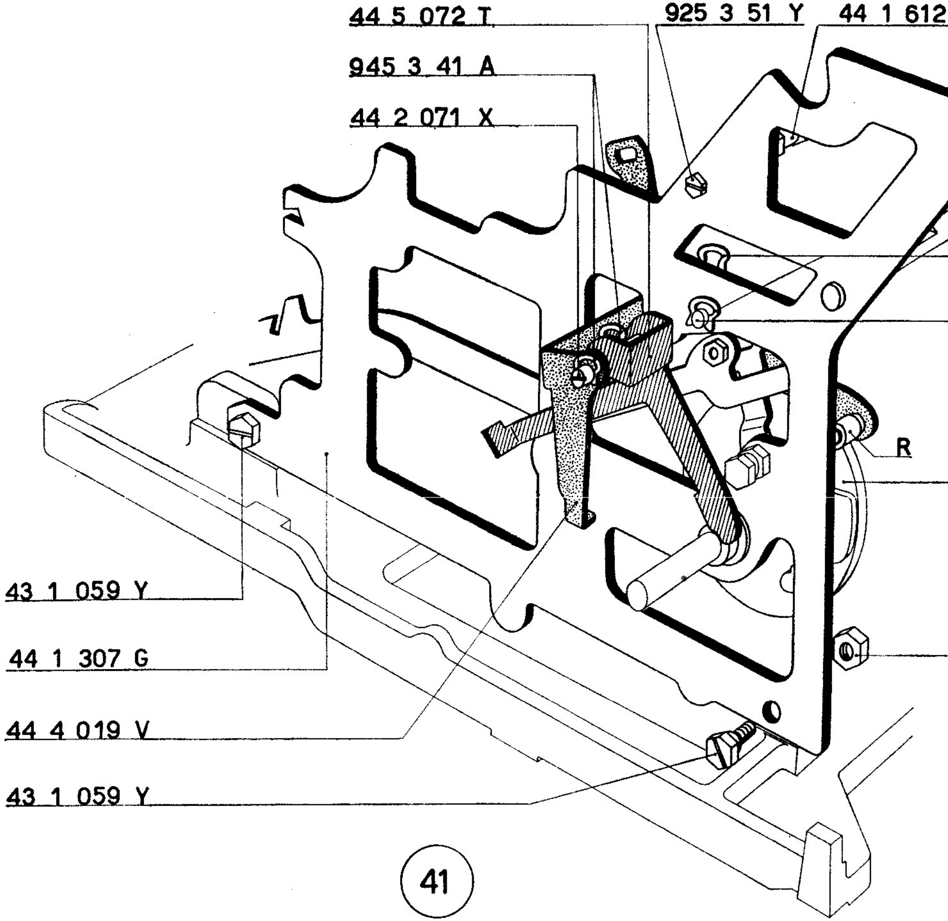
e) Stop the 44 4 019 V and the 44 5 072 T by means of two spring clips 945 3 41 A.

f) Stop the signs bridges shaft 44 7 099 Z by means of two spring clips 945 2 51 G.

g) Secure the signs bridges by means of 8 spring clips 945 3 41 A (which must be placed in the spots shown by the arrows (figure 93) after having placed the washer 940 4 61 A on the proper shaft.

h) Hook the spring 68 0 207 Q (placed on the washer 940 5 33 S - figure 39) to the slider 44 4 012 N (figure 42).

44 1 307 G	Right external side-plate
44 1 612 Z	Side-plates connection right column
44 2 071 X	Shaft for 44 4 019 V and 44 5 072 T
44 4 012 N	Totals universal bar slider
44 4 019 V	Starting lever
44 4 166 V	Shaft for the racks universal bar bridge
44 5 072 T	Second register subtraction control selector
44 7 099 Z	Signs control bridges shaft
43 1 059 Y	Side-plate securing-screw
43 4 450 U	Wheel with starting plate and dragging tooth
68 0 207 Q	Spring for 44 4 012 N
925 3 51 Y	Side-plate securing screw
938 5 05 Z	Nut for 43 1 059 Y
945 2 51 G	Spring clip
945 3 41 A	Spring clip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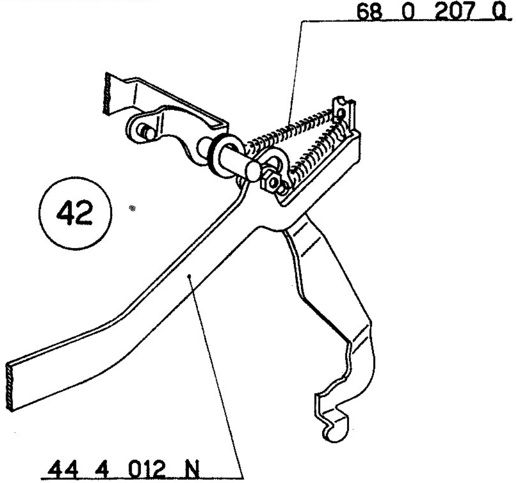
925 3 51 Y
44 1 612 Z
44 4 166 V
945 3 41 A
44 2 071 X
945 2 51 G
44 7 099 Z
R
43 4 450 U
938 5 05 Z
43 1 059 Y
44 1 307 G
44 4 019 V
43 1 059 Y

41


68 0 207 Q
44 4 012 N

42

Heinz Hemmen
UNDERWOOD AGENCY
704 W. Garland Ave.
Garland, Texas
BR 6-8411

51 - FIGURE 43

Adjusting the axial and angular position of the disc 43 4 450 U.

a) Move the main cam to rest position. Move the main shaft so that the cam 44 5 359 P *goes stopping against the left internal side-plate of the machine.*

b) In these conditions move the hub of the control disc 43 4 450 U *against the right external side-plate.*

c) Move angularly the control disc 43 4 450 U *so that the pivot* **P** *is stopped by the bottom of the slot* **A**. *Tighten the two screws* 922 3 51 V *and* 43 4 161 N.

Rotate the shaft one cycle and check that there is the clearance of 0.1 *mm. shown in the figure.*

52 - FIGURE 44

Assembling the back-space tooth control lever. .

a) On the left external side-plate of the machine assemble the back-space tooth control lever 43 4 014 T by means of the stud screw 926 3 33 P. The lever 43 4 014 E should take, with respect to the tooth 43 2 082 H, the position illustrated in the figure.

b) Between the lever 43 4 014 E and the left external side-plate, hook the spring 40 5 123 L.

53 - FIGURE 44

Assembling the slide transmission arm.

a) In the proper guide hole of the left external side-plate insert the shaft 47 3 019 S on which should be placed the slide transmission arm 44 2 073 Z.

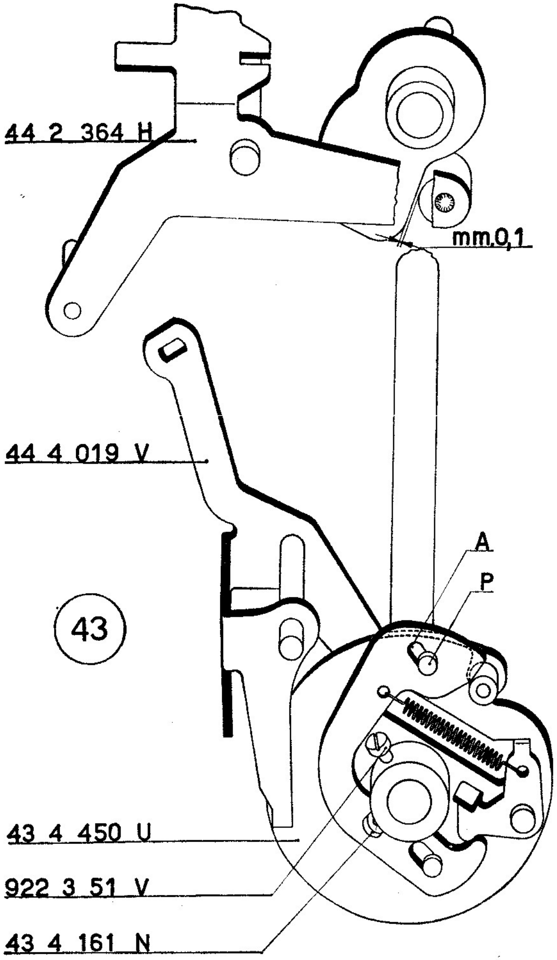
b) Connect the arm 44 2 073 Z to the pivot 44 2 074 S of the lever 43 2 085 C by means of the small block 43 2 087 E.

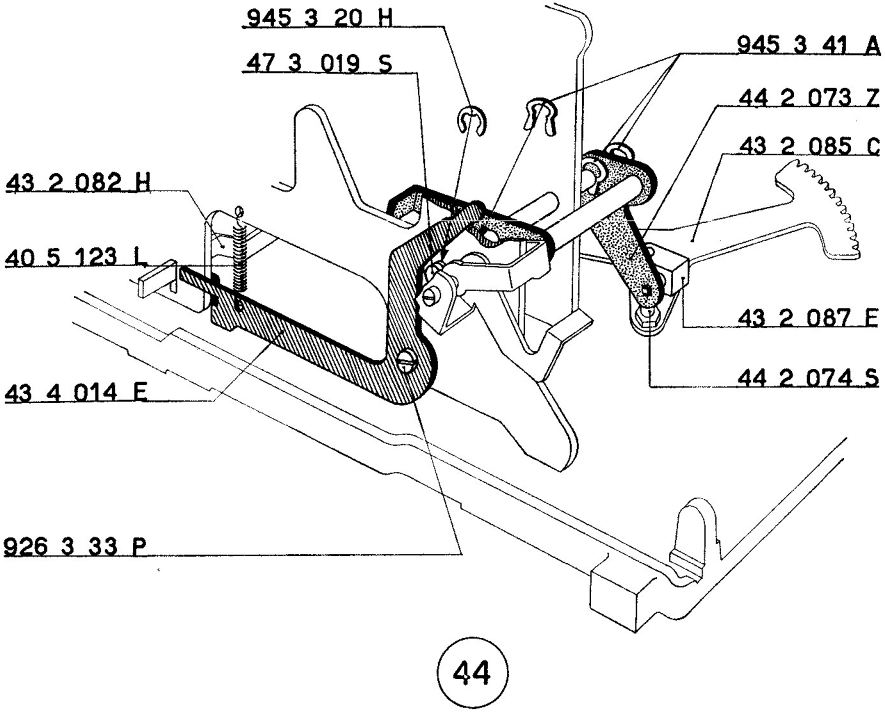
c) Secure the shaft by means of a spring clip 945 3 20 H and one 945 3 41 A.

d) Secure the shaft 44 2 073 Z by means of two spring clips 945 3 41 A.

44 2 073 Z	Slide transmission frame left arm
44 2 074 S	Slide transmission adjustable pivot
44 2 364 H	Transmission bridge control lever
44 4 019 V	Starting lever
40 5 123 L	Spring for 43 4 014 E
43 2 082 H	Back-space tooth
43 2 085 C	Slide transmission lever
43 2 087 E	Slide transmission lever frame and lever connection block

43 4 014 E	Back-space tooth control lever
43 4 161 N	Perforating screw for 43 4 450 U
43 4 450 U	Wheel with starting plate and dragging tooth
47 3 019 S	Shaft
922 3 51 V	Perforating screw for 43 4 450 U
926 3 33 P	Screw for 43 4 014 E
945 3 51 V	Spring clip
945 3 41 A	Spring clip


44 2 364 H
mm.0,1
44 4 019 V
A
P
43
43 4 450 U
922 3 51 V
43 4 161 N


945 3 20 H
47 3 019 S
945 3 41 A
44 2 073 Z
43 2 085 C
43 2 082 H
40 5 123 L
43 2 087 E
44 2 074 S
43 4 014 E
926 3 33 P
44

54 - FIGURE 45

Assembling the registers engagement and disengagement frames control bridges.

a) On the second register engagement and disengagement frame control bridge 44 4 692 V assemble correctly orientated the proper connecting-rod 44 4 095 J securing it with a spring clip 945 2 21 S.

b) On the pivot of the upper lever 44 4 689 A assemble the bridge now prepared securing it by means of a spring clip 945 2 51 G. The small connecting-rod 44 4 095 J must be connected to the bridge 44 7 095 M and secured with a spring clip 945 2 21 S.

c) On the first register engagement and disengagement frame control bridge 44 4 692 V assemble correctly orientated the proper connecting-rod 44 4 094 R securing it with a spring clip 945 2 21 S.

d) On the pivot of the lower lever 44 4 689 A assemble the bridge now prepared securing it with a spring clip 945 2 51 G. The small connecting-rod 44 4 094 R must be connected to the bridge 44 7 093 K and secured with a spring clip 945 2 21 S.

e) Check that the cilindric part of the pivots **K** *of the bridges* 44 4 692 V *is centered with respect to the front extensions of the plate* 44 4 085 Q. *Act if necessary on the pivots.*

55 - FIGURE 45

Assembling the sliders flexible rods.

a) On the shaft 44 4 166 V secure by means of two screws 920 3 03 G the small rods guide plate 44 4 111 N.

b) Assemble the two rods 44 4 118 V. Their front slots must be inserted on the pivots **P** and **P2** of the bridges 44 7 093 K and 44 7 095 M; the rear extensions must be guided by the slots of the small plate 44 4 111 N.

c) Hook three springs 68 0 411 U respectively:

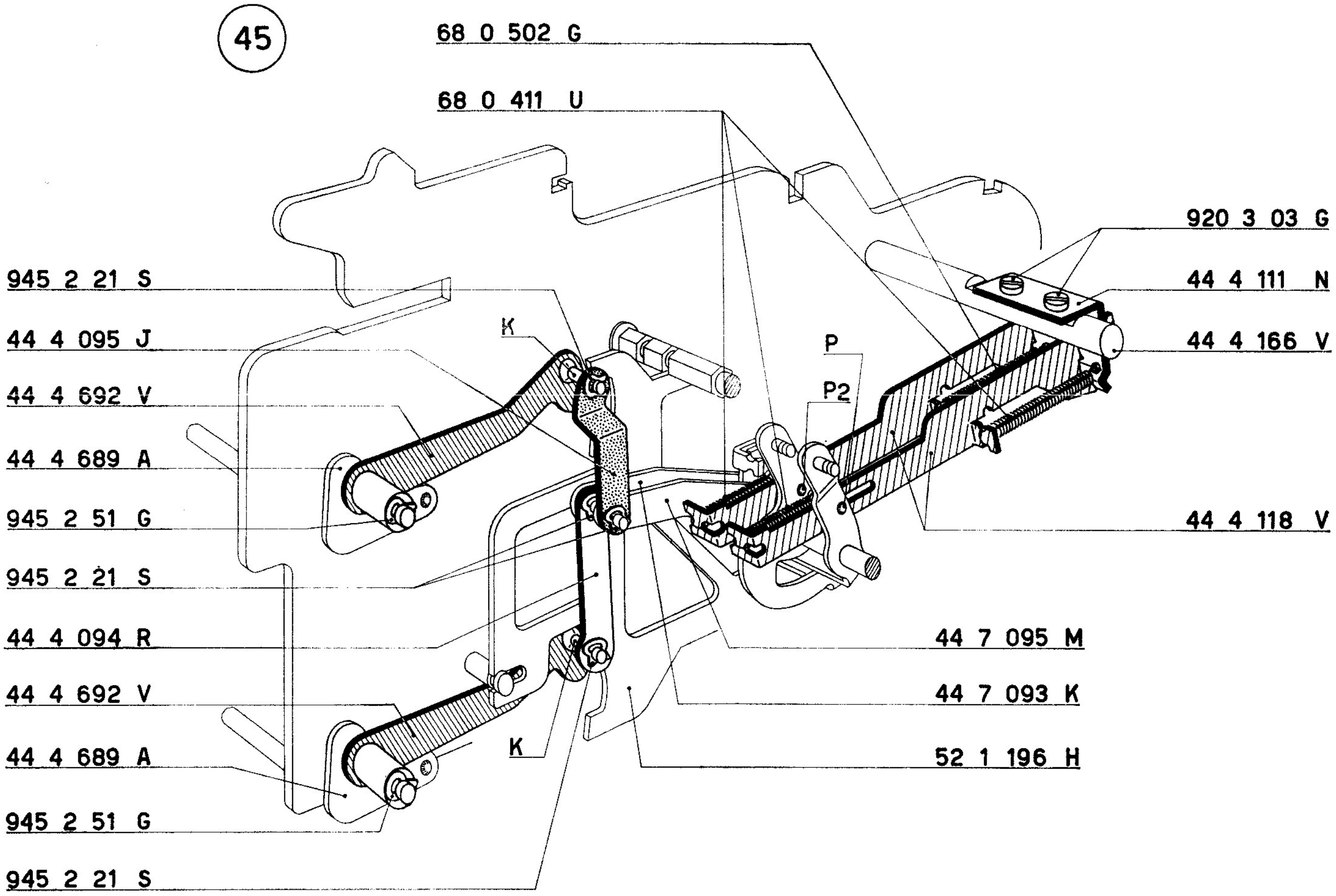
— between the pivot **P** of the bridge 44 7 093 K and the rod 44 4 118 V

— between the pivot **P2** of the bridge 44 7 095 M and the rod 44 4 118 V

— between the rod 44 4 118 V (external) and the small plate 44 4 111 N.

d) Hook the spring 68 0 502 G between the rod 44 4 118 V (internal) and the small plate 44 4 111 N.

44 4 094 R	Small connecting-rod placed between the selecting bridge and the first register engagement control
44 4 095 J	Small connecting-rod placed between the selecting bridge and the second register engagement control
44 4 111 N	Sliders flexible rods guide plate
44 4 118 V	Slider flexible rod
44 4 166 V	Shaft of the racks universal bar bridge
44 4 689 A	Shaft with right lever of the registers engagement and disengagement control frame
44 4 692 V	Registers engagement and disengagement frames control bridge
44 7 093 K	First register special signs selecting bridge
44 7 095 M	Second register special signs selecting bridge
52 1 196 H	Register engagement control plate (on the racks)
68 0 411 U	Spring for 44 4 118 V
68 0 502 G	Spring for 44 4 118 V
920 3 03 G	Securing screw for 44 4 111 N
945 2 21 S	Spring clip
945 2 51 G	Spring clip


45
68 0 502 G
68 0 411 U
920 3 03 G
44 4 111 N
44 4 166 V
945 2 21 S
44 4 095 J
K
P
P2
44 4 692 V
44 4 689 A
945 2 51 G
44 4 118 V
945 2 21 S
44 4 094 R
44 7 095 M
44 4 692 V
44 7 093 K
K
44 4 689 A
52 1 196 H
945 2 51 G
945 2 21 S

56 - FIGURES 46 and 47

Assembling the credit balance slider and the first register total and calculation slider.

a) In the proper hole of the right external side-plate insert the shaft 44 3 084 N on which should be placed the bridge 52 6 118 P. The chamfered end of the shaft must be inserted in the hole made on the shaft of the first register transmission levers by interposing the washer 940 3 39 P.

b) Secure the shaft 44 3 084 N by means of a spring clip 945 2 51 G.

c) Secure the bridge 52 6 118 P by means of two spring clips 945 3 41 A.

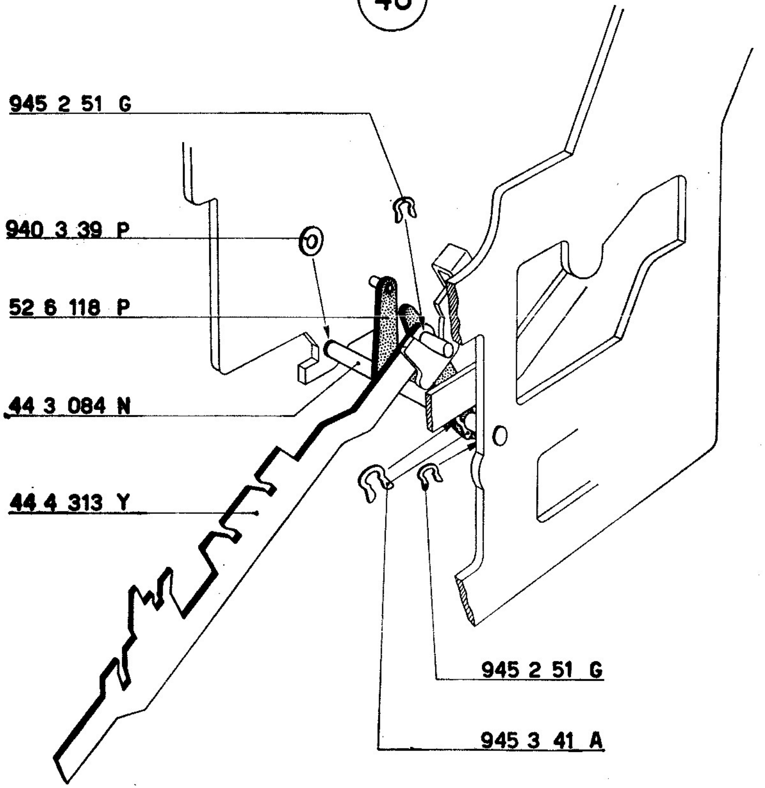
d) On the pivot of the bridge 52 6 118 P assemble the credit balance slider 44 4 313 Y securing it by means of a spring clip 945 2 51 G.

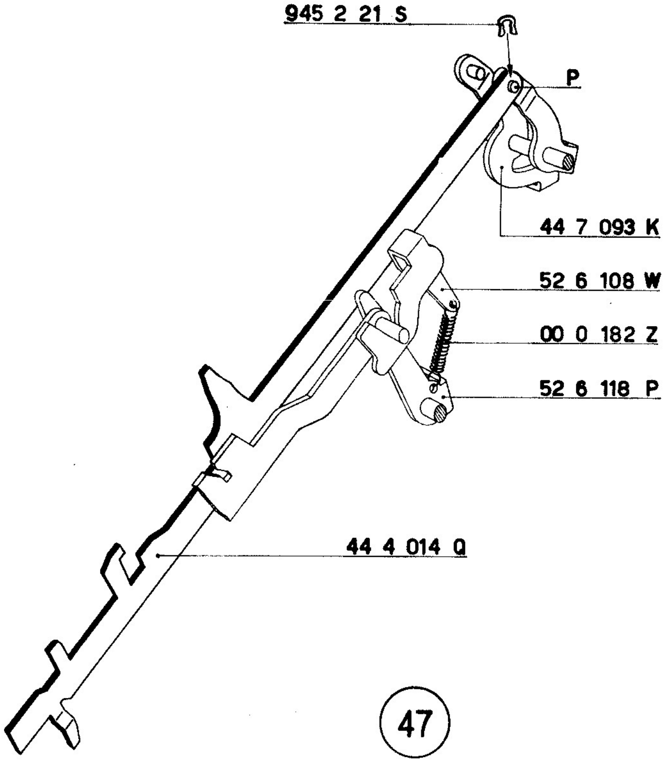
e) Between the bridge 52 6 118 P and the stabilizer 52 6 108 W hook the spring 00 0 182 Z (figure 47).

f) On the pivot **P** of the bridge 44 7 093 K assemble the first register total and calculation slider 44 4 014 Q securing it with a spring clip 945 2 21 S (figure 47).

44 3 084 N	Shaft of the bridge 52 6 118 P
44 4 014 Q	First register total and calculation hook
44 4 313 Y	Credit balance slider
44 7 093 K	First register special signs selecting bridge
00 0 182 Z	• Spring for 52 6 118 P - 52 6 108 W
52 6 108 W	Credit balance slider stabilizer
52 6 118 P	Credit balance control bridge
940 3 39 P	Washer
945 2 21 S	Spring clip
945 2 51 G	Spring clip
945 2 41 A	Spring clip

㊻


945 2 51 G
940 3 39 P
52 6 118 P
44 3 084 N
44 4 313 Y
945 2 51 G
945 3 41 A


945 2 21 S
P
44 7 093 K
52 6 108 W
00 0 182 Z
52 6 118 P
44 4 014 Q

㊼

57 - Preparing the keyboard unit.

a) FIGURE 48

Hook the springs 42 2 042 N:

— to the proper pivot of the « division stop » and « non-add » key-stem 44 4 007 S

— to the proper pivot of the « multiplier motor » key-stem 44 4 006 Z.

b) FIGURE 48

In the proper guide seats of the support 44 5 165 V place successively:

— the « division stop » key-stem 44 4 007 S

— the « multiplier motor » key-stem 44 4 006 Z

— the « multiplication control » key-stem 44 4 305 H

— the « negative multiplication » key-stem 44 5 092 Q. Its pivot **P** should be connected to the guide slot of the support while its lateral extension should be placed above the pivot **K** of the stem 44 4 305 H.

c) FIGURE 49

In the proper guide seat of the support 44 5 165 V place the small racks clearing and multiplication memory slider 44 5 147 T.

d) FIGURE 50

In the proper guide seats of the support 44 5 165 V place successively:

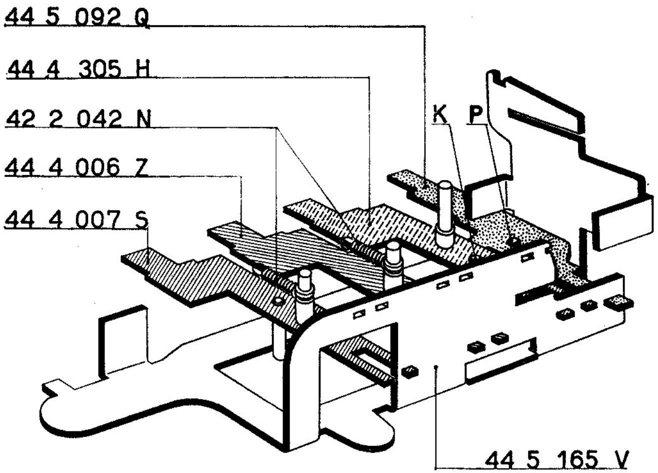
— the « memory reading » key-stem 44 4 001 U

— the « memory input » key-stem 44 4 004 X

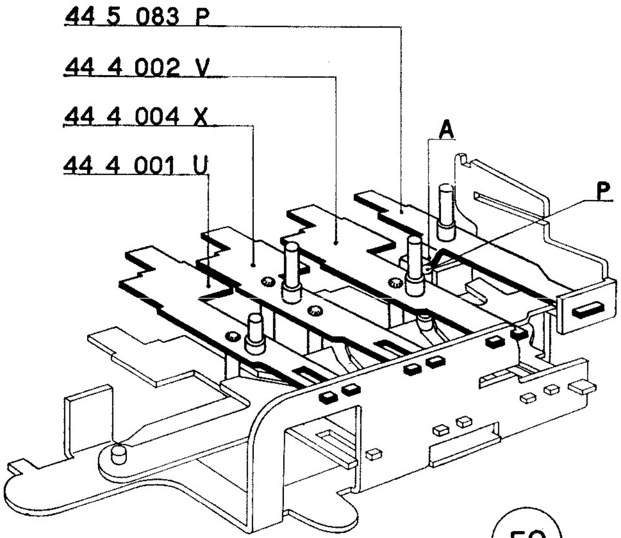
— the « division control » key-stem 44 4 002 V

— the « cubic » key-stem 44 5 083 P. Its extension **A** must be placed above the pivot **P** of the « multiplier motor » key 44 4 006 Z.

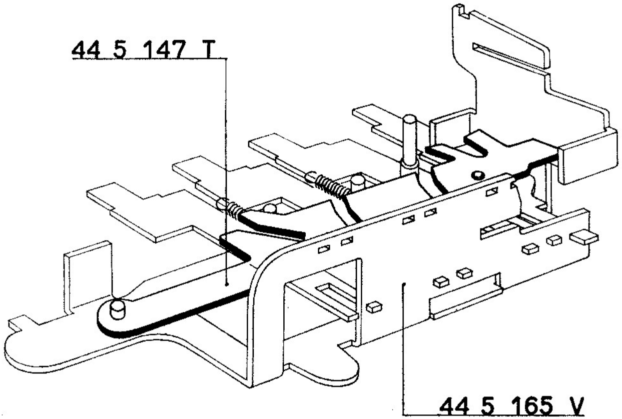
44 4 001 U	« Memory reading » key-stem
44 4 002 V	« Division control » key-stem
44 4 004 X	« Memory input » key-stem
44 4 006 Z	« Multiplier motor » key-stem
44 4 007 S	« Division stop » key-stem
44 4 305 H	« Multiplication control » key-stem
44 5 083 P	« Cubic » key-stem
44 5 092 Q	« Negative multiplication » key-stem
44 5 147 T	Small racks clearing and multiplication memory slider
44 5 165 V	Key-guide support
42 2 042 N	Spring for 44 4 006 Z and 44 4 007 S


44 5 092 Q
44 4 305 H
42 2 042 N
44 4 006 Z
44 4 007 S
K
P
44 5 165 V

48


44 5 083 P
44 4 002 V
44 4 004 X
44 4 001 U
A
P

50


44 5 147 T
44 5 165 V

49

e) FIGURE 51

Assemble the unit prepared on the keyboard plate 44 2 021 M. The 8 key-stems and the upper extensions of the support 44 5 165 V must be placed in the proper guide seats made in the plate.

Secure the support 44 5 165 V by means of two screws 920 2 12 U.

44 2 021 M	Keyboard plate
44 4 001 U	« Memory reading » key-stem
44 4 002 V	« Division control » key-stem
44 4 004 X	« Memory input » key-stem
44 4 305 H	« Multiplication control » key-stem

f) FIGURES 51 and 52

Hook the two springs 42 2 042 N of the stems 44 4 006 Z and 44 4 007 S (see the figure 48) to the proper holes made in the plate 44 2 021 M.

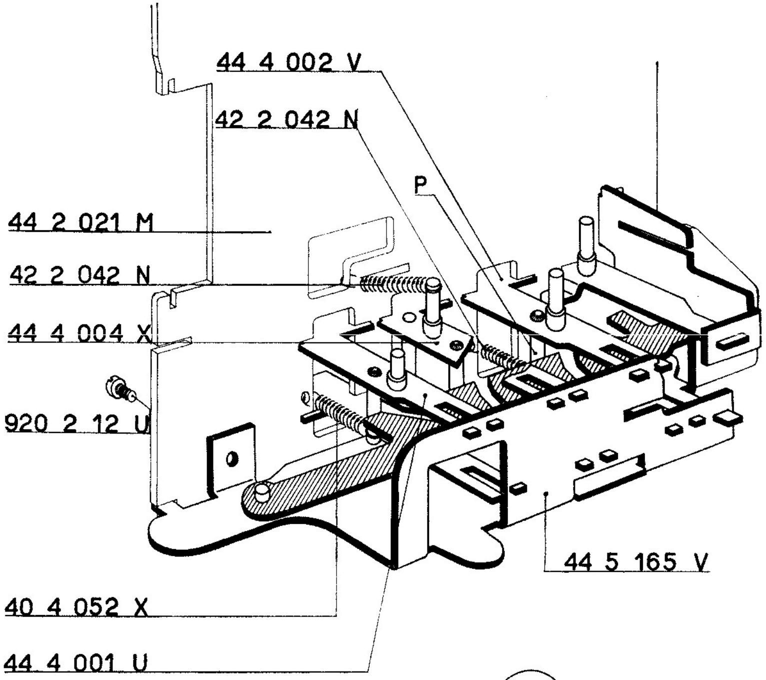
Hook the spring 42 2 042 N between the stem 44 4 004 X and the plate 44 2 021 M (figure 51).

Hook the spring 40 4 052 X between the stem 44 4 001 U and the plate 44 2 021 M (figure 51).

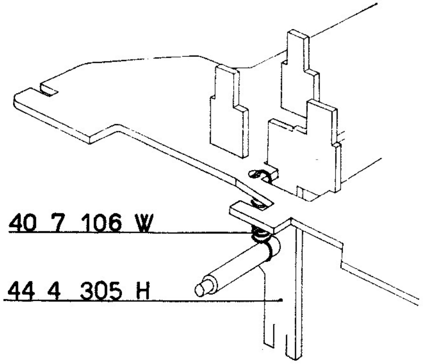
Hook the spring 42 2 042 N between the stem 44 4 002 V and the plate 44 2 021 M (figure 51).

Hook the spring 40 7 106 W between the stem 44 4 305 H and the plate 44 2 021 M (figure 52).

44 5 165 V	Keys guide support
40 4 052 X	Spring for 44 4 001 U
40 7 106 W	Spring for 44 4 305 H
42 2 042 N	Spring for 44 4 002 V and for 44 4 004 X
920 2 12 U	Securing screw for 44 5 165 V


44 4 002 V
42 2 042 N
P
44 2 021 M
42 2 042 N
44 4 004 X
920 2 12 U
44 5 165 V
40 4 052 X
44 4 001 U

(51)


40 7 106 W
44 4 305 H

(52)

g) FIGURE 53

In the proper guide slots of the keyboard plate 44 2 021 M place successively:

— the two key-stems 44 4 001 U of the first register total and subtotal

— the second register total key-stem 44 4 003 W

— the second register subtotal key-stem 44 4 002 V

— the second register add key-stem 43 4 005 N

— the first register add key-stem 52 6 029 R.

On the plate 44 2 021 M place, as illustrated in the figure, the key-guide support 44 4 032 J and insert in the guide slots of the plate:

— the second register subtraction key-stem 52 6 034 E

— the first register subtraction key-stem 44 4 008 B.

h) FIGURE 54

Raise the key-guide support 44 4 032 J seeing that:

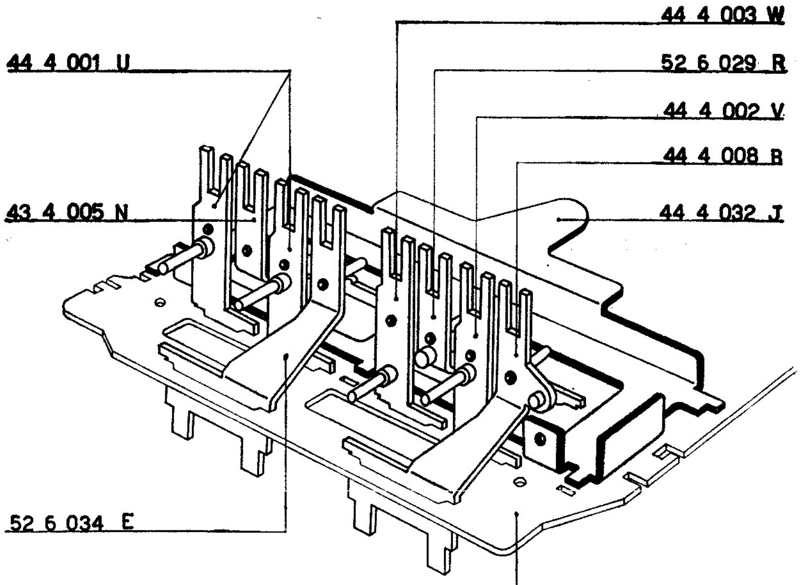
— the key-stems are placed in the proper guide slots of the support

— its three extensions are inserted in the guide slots of the plate 44 2 021 M.

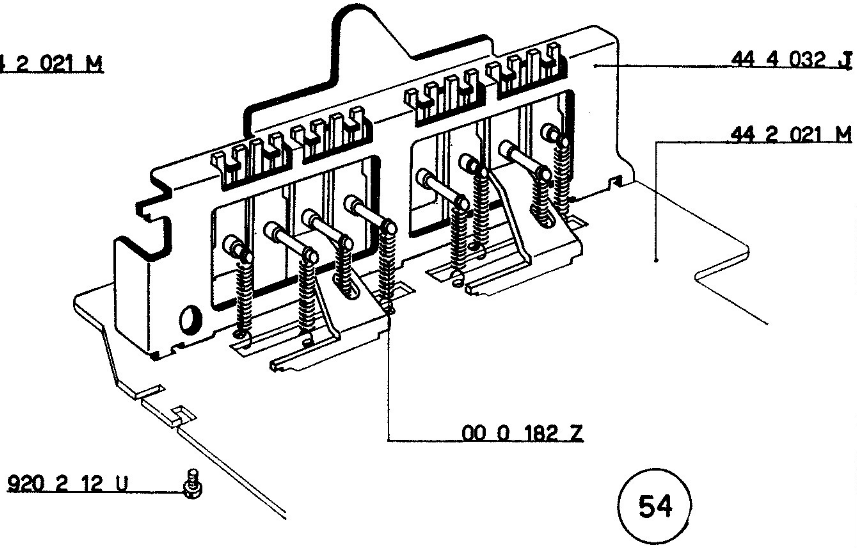
Secure the support to the plate by means of a screw 920 2 12 U and a screw 920 2 11 T (not visible in the figure).

Between the 8 stems assembled and the plate 44 2 021 M hook as many springs 00 0 182 Z.

44 2 021 M	Keyboard plate
44 4 001 U	First register « total » and « subtotal » key-stem
44 4 002 V	Second register « subtotal » key-stem
44 4 003 W	Second register « total » key-stem
44 4 008 B	First register « subtraction » key-stem
44 4 032 J	Keys guide right support
00 0 182 Z	Spring for 44 4 001 U, 44 4 002 V, 44 4 003 W, 44 4 008 B, 52 6 029 R, 43 4 005 N, 52 6 034 E
43 4 005 N	Second register « add » key-stem
52 6 029 R	First register « add » key-stem
52 6 034 E	Second register « subtraction » key-stem
920 2 11 T	Securing screw for 44 4 032 J
920 2 12 U	Securing screw for 44 4 032 J


44 4 003 W
44 4 001 U
52 6 029 R
44 4 002 V
44 4 008 B
43 4 005 N
44 4 032 J
52 6 034 E
44 2 021 M

(53)


44 4 032 J
44 2 021 M
00 0 182 Z
920 2 12 U

(54)

i) FIGURE 55

On the upper connection stay 43 2 023 D secure the small numeral key-stems guide vertical plate 44 2 322 X by means of two screws 920 2 12 U.

Assemble the stay 43 2 023 D on the plate 44 2 021 M by means of a screw 920 2 12 U which must not be tightened right home. The stay 43 2 023 D must be perpendicular to the plate.

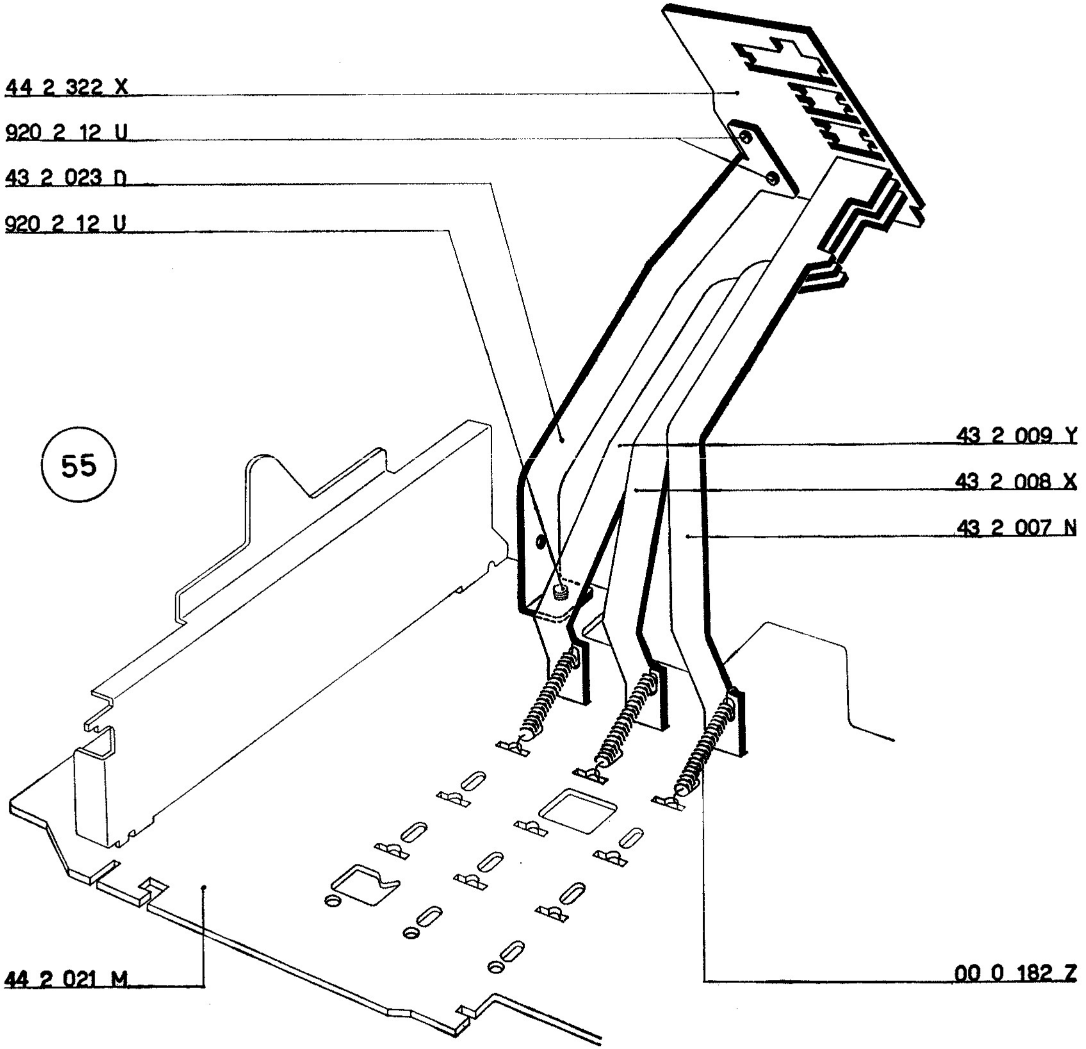
Assemble the key-stems 9, 8 and 7 which are respectively: 43 2 009 Y, 43 2 008 X and 43 2 007 M. They must be inserted in the proper guide slots of the plate 44 2 021 M and of the small plate 44 2 322 X.

Hook the springs 00 0 182 Z between the key-stems and the plate 44 2 021 M.

N.B. — By following the same instructions assemble the key-stems 6, 5, 4, 3, 2 and 1. We have not illustrated them but they are easily recognizable. The shape of the bent is the same while their lenght varies according to the row they occupy on the keyboard plate. Their code numbers are respectively: 43 2 006 M, 43 2 005 L, 43 2 004 K, 43 2 003 J, 43 2 002 R and 43 2 001 Q.

Check that the key-stems slide perfectly; tighten but not right home the screw 920 2 12 U which secures the stay 43 2 023 D to the plate 44 2 021 M.

44 2 021 M	Keyboard plate
44 2 322 X	Numeral key-stems guide vertical plate
00 0 182 Z	Key-stems spring
43 2 001 Q	Key-stem 1
43 2 002 R	Key-stem 2
43 2 003 J	Key-stem 3
43 2 004 K	Key-stem 4
43 2 005 L	Key-stem 5
43 2 006 M	Key-stem 6
43 2 007 N	Key-stem 7
43 2 008 X	Key-stem 8
43 2 009 Y	Key-stem 9
43 2 023 D	Connection upper stay
920 2 12 U	Securing screw for 44 2 322 X - 43 2 023 D and 44 2 021 M

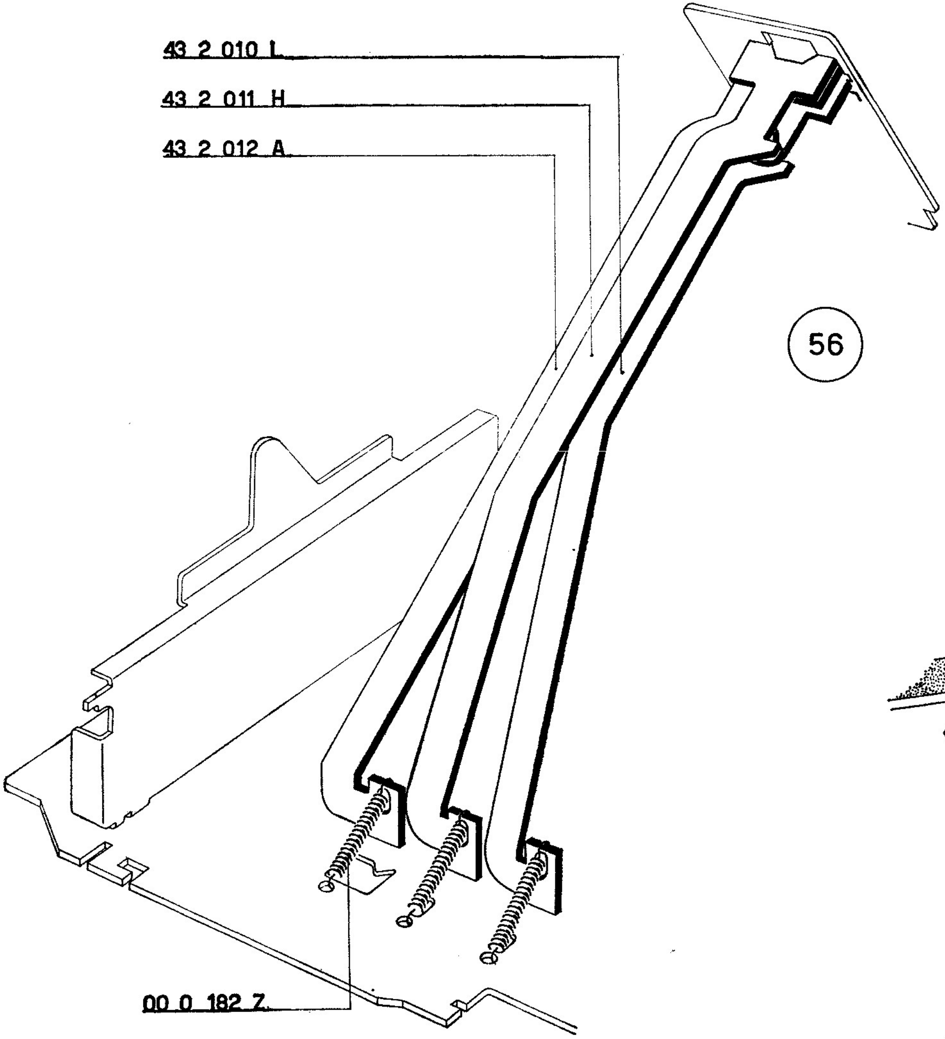

44 2 322 X
920 2 12 U
43 2 023 D
920 2 12 U
55
43 2 009 Y
43 2 008 X
43 2 007 N
44 2 021 M
00 0 182 Z

l) FIGURES 56 and 57

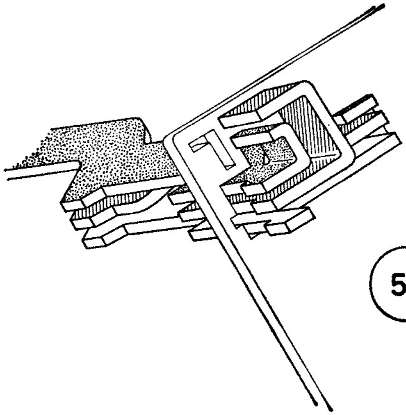
Assemble the key-stems 0, 00, 000; the code numbers are respectively 43 2 010 L, 43 2 011 H and 43 2 012 A.

Follow the instructions described for the assembly of the other numeral key-stems. The rear extensions of these stems should take the position illustrated in the figure 27.

00 0 182 Z	Spring for 43 2 010 L, 43 2 011 H, 43 2 012 A
43 2 010 L	Key-stem 0
43 2 011 H	Key-stem 00
43 2 012 A	Key-stem 000


43 2 010 L
43 2 011 H
43 2 012 A
00 0 182 Z

56



57

m) FIGURE 50

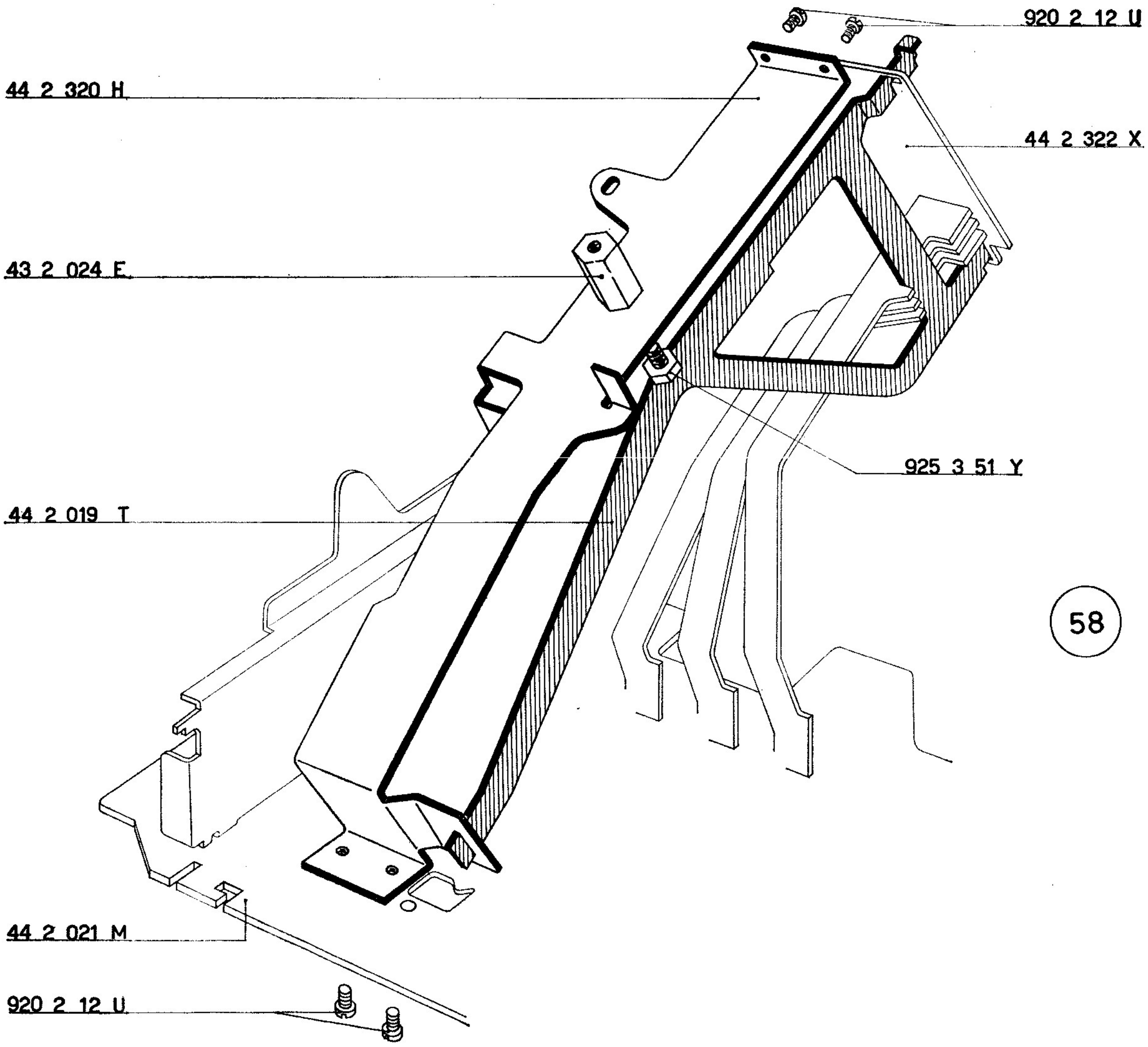
Place the rear extension of the keyboard universal bar plate 44 2 019 T in the proper guide slot of the small plate 44 2 022 N.

On the connection lower stay 44 2 320 H secure the column 43 2 024 E by means of a screw 925 3 51 Y.

Assemble the connection lower stay 44 2 320 H; in its front slot we must insert the bar 44 2 019 T. Secure the stay 44 2 320 T to the keyboard plate 44 2 021 M and to the small plate 44 2 322 X by means of four screws 920 2 12 U.

Check that the key-stems slide perfectly. Then tighten the screws 920 2 12 U which secure the stay 43 2 023 D to the small plate 44 2 322 X (figure 55).

44 2 019 T	Keyboard universal bar plate
44 2 021 M	Keyboard plate
44 2 320 H	Connection lower stay
44 2 322 X	Numeral key-stems guide vertical plate
43 2 024 E	Column for 44 2 320 H
920 2 12 U	Securing screw for 44 2 320 H
925 3 51 Y	Screw for 43 2 024 E


920 2 12 U
44 2 320 H
44 2 322 X
43 2 024 E
925 3 51 Y
44 2 019 T
58
44 2 021 M
920 2 12 U

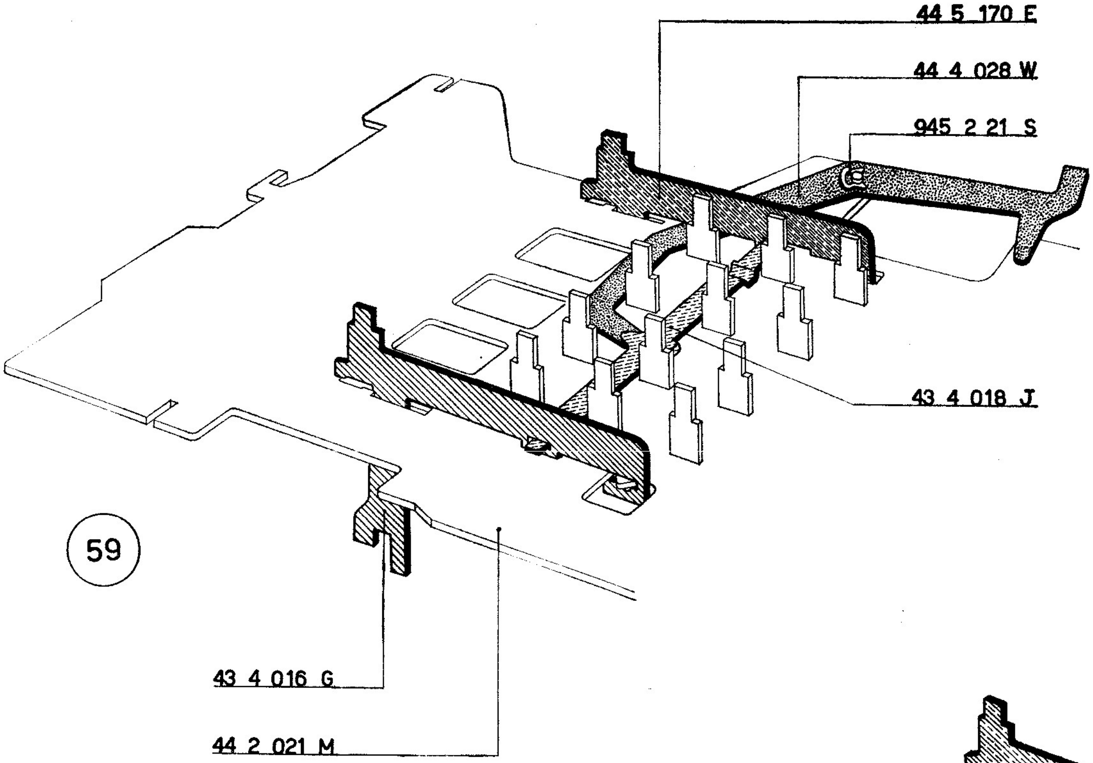
n) FIGURES 59 and 60

Place on the keyboard plate 44 2 021 M the small repeat release plate 43 4 018 J.

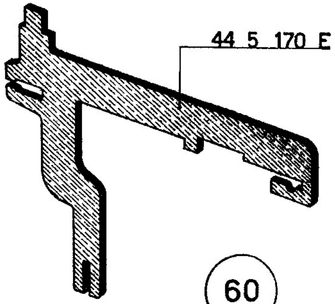
Assemble successively the repeat key-stem 43 4 016 G and the automatic exclusion key-stem 44 5 170 E which is also illustrated in the figure 60. The front end of the small plate 43 4 108 J must be inserted in the proper slot of the stem 43 4 016 G while the rear end must be placed, with respect to the stem 44 5 170 S, as illustrated in the figure 59.

Assemble on the keyboard plate the repeat release lever 44 4 028 W securing it with a spring clip 945 2 21 S.

44 2 021 M	Keyboard plate
44 4 028 W	Non-add and repeat release transmission lever
44 5 170 E	Automatic exclusion key-stem
43 4 016 G	Repeat key-stem
43 4 018 J	Repeat release plate
945 2 21 S	Spring clip for 44 4 028 W


44 5 170 E
44 4 028 W
945 2 21 S
43 4 018 J
43 4 016 G
44 2 021 M

59



60

o) FIGURE 61

Hook the spring 68 0 303 Q between the repeat key-stem 43 4 016 Q and the automatic exclusion key-stem 44 5 170 E.

Place in the guide slots of the plate 44 2 021 M:

— the « clearing » key-stem 43 4 002 K

— the « back-space » key-stem 43 4 002 K;

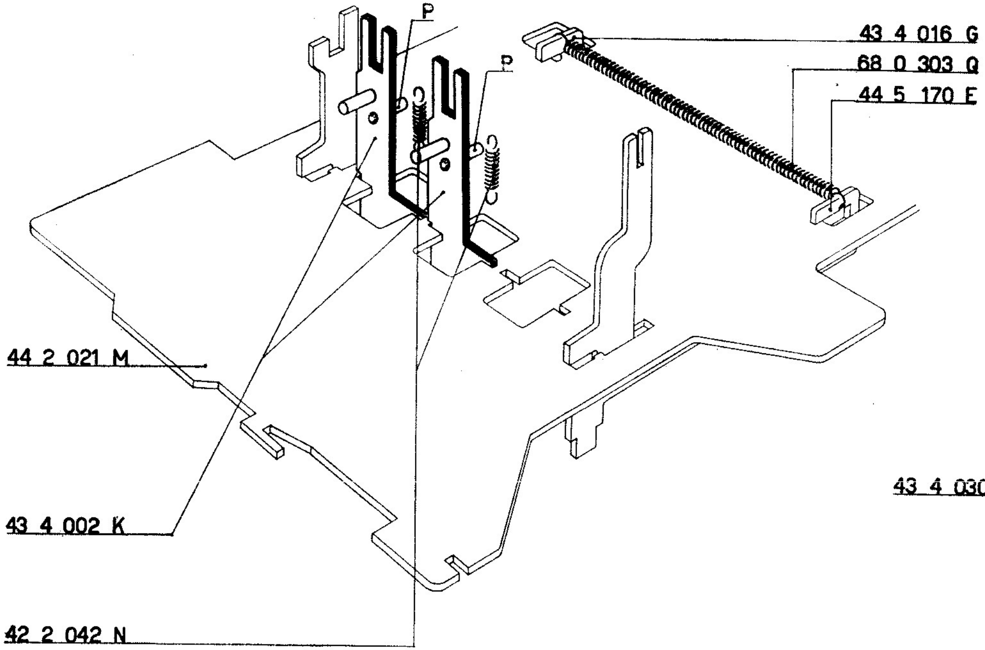
on the pivots **P** of these key-stems hook a spring 42 2 042 N.

44 2 021 M	Keyboard plate
44 4 021 P	Keys guide left support
44 4 327 W	Clutch control left slider
44 5 170 E	« Automatic exclusion » key-stem
42 2 042 M	Spring for 43 4 002 K

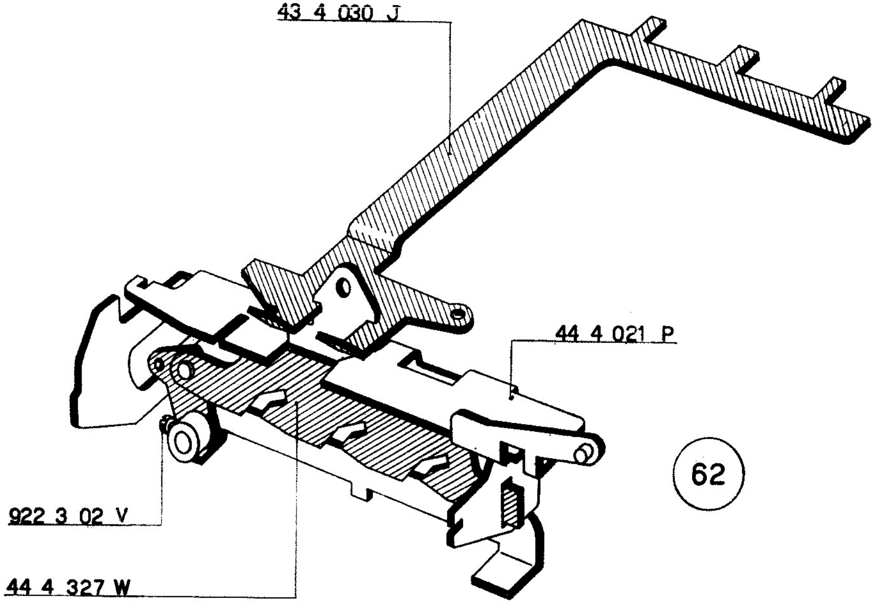
p) FIGURE 62

In the proper guide slot of the keys guide left support 44 4 021 P insert, as illustrated in the figure, the clutch control left slider 44 4 327 W on which crank must be placed the screw 922 3 02 V. In the proper guide slots of the support 44 4 021 P insert the locking plate 43 4 030 J.

43 4 002 K	« Back-space » and « clearing » key-stems
43 4 016 G	« Repeat » key-stem
43 4 030 J	Locking plate
68 0 303 Q	Spring for 44 5 170 E and 43 4 016 G
922 3 02 V	Screw for crank of slider 44 4 327 W


P
P
43 4 016 G
68 0 303 Q
44 5 170 E
44 2 021 M
43 4 002 K
42 2 042 N

61


43 4 030 J
44 4 021 P
922 3 02 V
44 4 327 W

62

q) FIGURE 63

Assemble on the keyboard plate 44 2 021 M the unit prepared at point *p*).

The extensions **A** of the plate 43 4 030 J must be inserted in the proper guide slots of the support 44 4 032 J.

The stems 43 4 002 K, 43 4 016 G and 44 5 170 E must be inserted in the guide slots of the support 44 4 021 P; the extensions of this latter must be inserted in the proper guides of the plate 44 2 021 M.

Secure the support 44 4 021 P by means of two screws 920 2 12 U.

Hook the springs 42 2 042 N of the two stems 43 4 002 K to the plate 44 2 021 M.

Hook the spring 40 7 109 H between the plate 43 4 030 J and the support 44 4 021 P.

r) FIGURE 63

a. Connect to the multiplication and division current slider 44 5 172 U, a crank 52 1 051 J with the proper screw 922 3 02 V. Secure the crank with a spring clip 945 2 21 S. Place this slider near the slider 44 5 147 T already assembled; the rear extension must be placed in the proper guide slot of the support 44 4 021 P.

b. In the proper guide hole of the support 44 5 165 V insert correctly orientated the shaft 44 5 132 L on which should be successively placed:

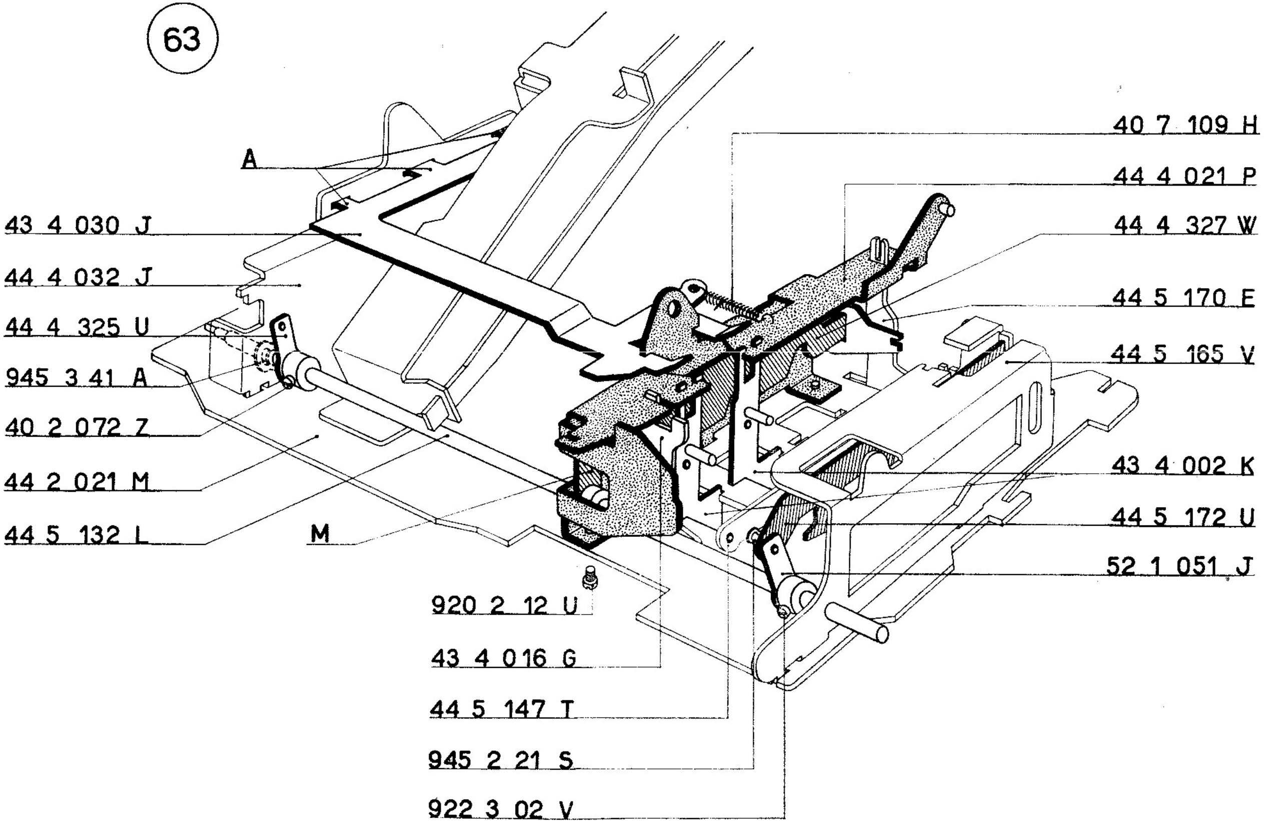
— the crank 52 1 051 J of the slider 44 5 172 U

— the crank 44 4 325 U with the proper screw 40 2 072 Z.

c. At the right end of the shaft 44 5 132 L place a spring clip 945 3 41 A.

44 2 021 M	Keyboard plate
44 4 021 P	Keys guide left support
44 4 032 J	Keys guide right support
44 4 325 U	Crank
44 4 327 W	Clutch control left slider
44 5 132 L	Shaft for rod control right arm
44 5 147 T	Small racks clearing and multiplication memory slider
44 5 165 V	Keys guide support
44 5 170 E	« Automatic exclusion » key-stem
44 5 172 U	Multiplication and division current slider
40 2 072 Z	Screw for 44 4 325 U
40 7 109 H	Spring for 43 4 030 J
43 4 002 K	« Back-space » and « clearing » key-stem
43 4 016 G	« Repeat » key-stem
43 4 030 J	Locking plate
52 1 051 J	Crank
920 2 12 U	Securing screw for 44 4 021 P
922 3 02 V	Screw for 52 1 051 J
945 2 21 S	Spring clip for 44 5 172 U
945 3 41 A	Spring clip for 44 5 132 L

63


A
43 4 030 J
44 4 032 J
44 4 325 U
945 3 41 A
40 2 072 Z
44 2 021 M
44 5 132 L
M
920 2 12 U
43 4 016 G
44 5 147 T
945 2 21 S
922 3 02 V
40 7 109 H
44 4 021 P
44 4 327 W
44 5 170 E
44 5 165 V
43 4 002 K
44 5 172 U
52 1 051 J

s) FIGURE 64

Between the plate 44 2 022 N and the stay 44 2 320 H assemble as illustrated in the figure, the cypher plate 44 5 139 T. To do this it is necessary to loosen the two screws 920 2 12 U.

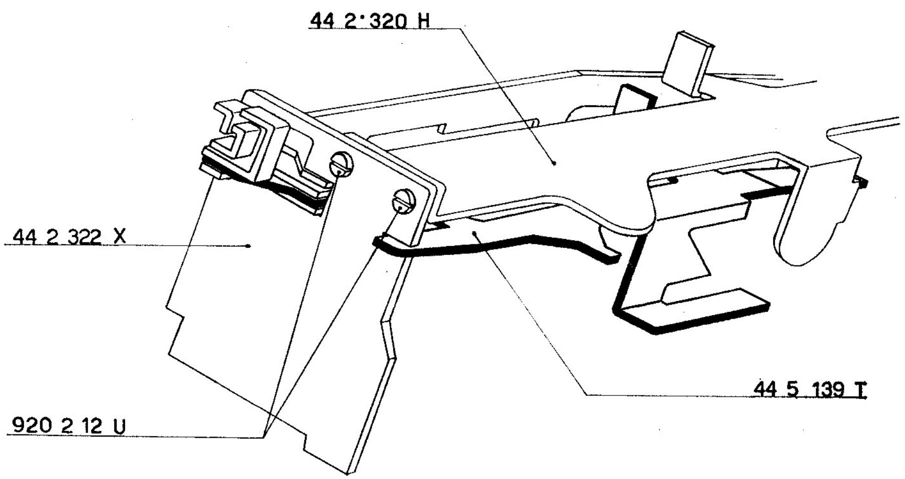
t) FIGURE 65

On the pivot 43 2 015 D place the current-keyboard reciprocal locking lever 43 2 014 C securing it with a spring clip 945 3 41 A. Assemble this unit on the stay 44 2 320 H, secure the pivot by means of a nut 938 3 05 G which must not be tightened right home. Hook the spring 40 7 109 H to the lever 43 2 014 C.

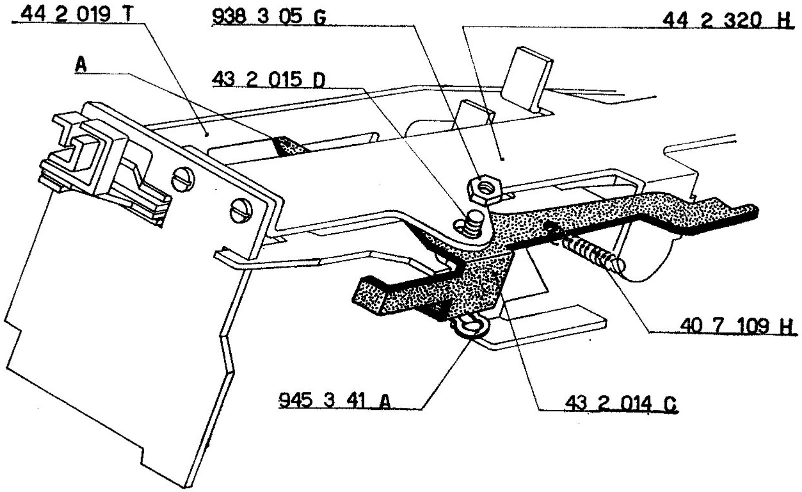
N.B. — The extension **A** of the lever 43 2 014 C must take, with respect to the universal bar 44 2 019 T, the position illustrated in the figure. It is necessary checking this position when we shall assemble the keyboard unit on the machine.

44 2 019 T	Keyboard universal bar plate
44 2 320 H	Connection lower stay
44 2 322 X	Numeral keys guide vertical plate
44 5 139 T	Cypher setting plate
43 2 014 C	Current-keyboard reciprocal locking lever

40 7 109 H	Spring for 43 2 014 C
43 2 015 D	Pivot for 43 2 014 C
920 2 12 U	Securing screw for 44 2 322 X and 44 2 320 H
938 3 05 G	Nut for 43 2 015 D
945 3 41 A	Spring clip


44 2 320 H
44 2 322 X
920 2 12 U
44 5 139 T

64


44 2 019 T
A
938 3 05 G
44 2 320 H
43 2 015 D
40 7 109 H
945 3 41 A
43 2 014 C

65

58 - FIGURES 66 - 67 - 68 - 69

Assembling the keyboard unit.

a) Assemble on the machine the keyboard unit seeing that:

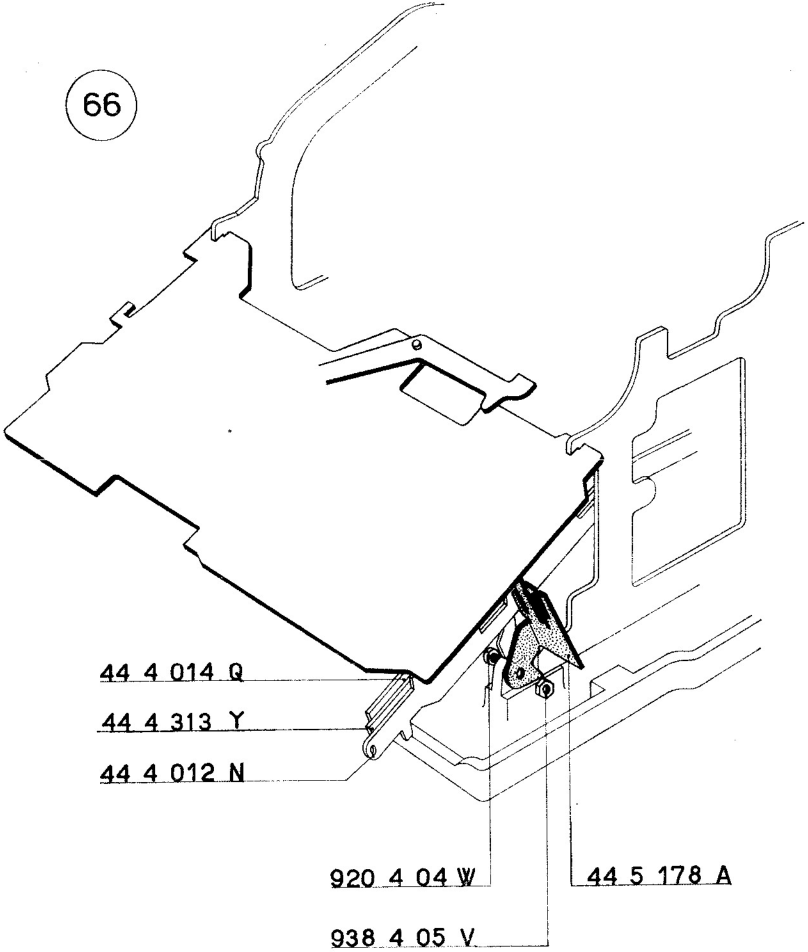
— the slots of its upper plate are fitted in the guides of the external side-plates of the machine (figure 66)

— the tenon **T** of the right internal side-plate 44 1 715 Y is inserted in the proper slot of the small plate 44 2 322 X (figure 67)

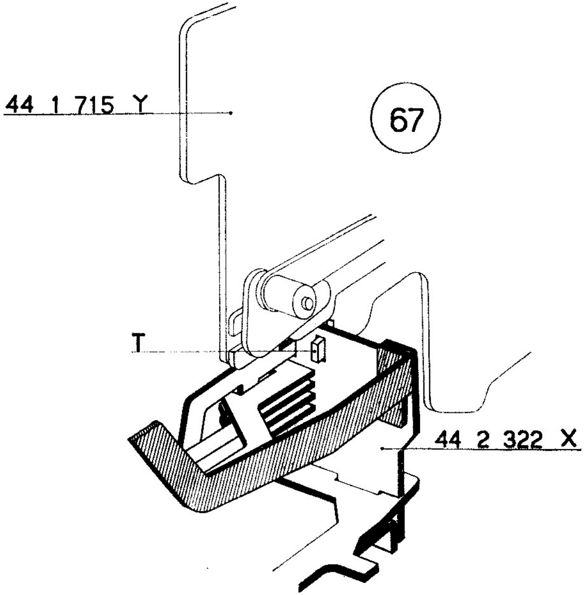
— the sliders 44 4 012 N, 44 4 313 Y and 44 4 014 Q take the position illustrated in the figure 66.

44 1 715 Y	Right internal side-plate
44 2 322 X	Numeral keys guide vertical plate
44 4 012 N	Total universal bar slider
44 4 014 Q	First register total and calculation slider
44 4 313 Y	Credit balance slider
44 5 178 A	Right arms guide bracket
920 4 04 W	Securing screw for keyboard
938 4 05 V	Hexagonal nut for 920 4 04 W

66


44 4 014 Q
44 4 313 Y
44 4 012 N
920 4 04 W
938 4 05 V
44 5 178 A

67


44 1 715 Y
T
44 2 322 X

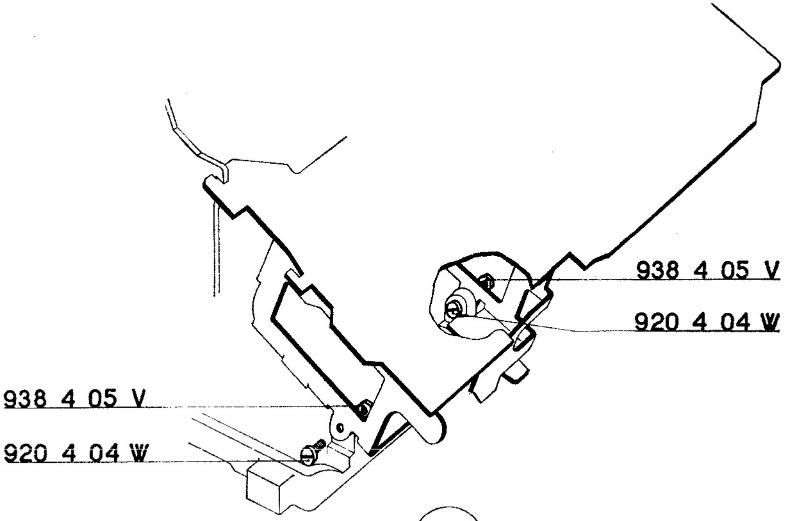
b) Secure the keyboard unit to the base of the machine by means of:

— three screws 920 4 04 W with the nuts 938 4 05 V (see figures 66 and 68). With the right screw and nut (figure 66) you should secure the small bracket 44 5 178 A also

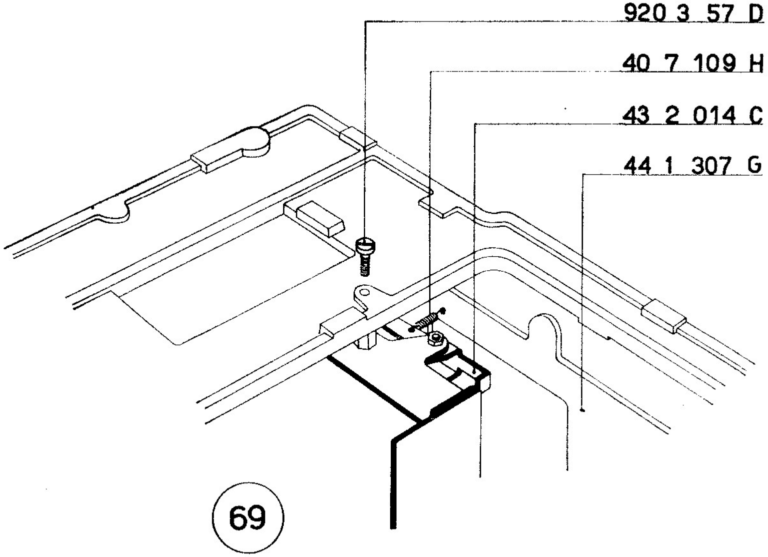
— a screw 920 3 57 D (figure 69).

c) Hook the spring 40 7 109 H of the lever 43 2 014 C to the right external side-plate 44 1 307 G.

44 1 307 G	Right external side-plate
40 7 109 H	Spring for 43 2 014 C
43 2 014 C	Current-keyboard reciprocal locking lever
920 3 57 D	Keyboard securing screw
920 4 04 W	Keyboard securing screw
938 4 05 V	Nut for 920 4 04 W


938 4 05 V
920 4 04 W
938 4 05 V
920 4 04 W

68


920 3 57 D
40 7 109 H
43 2 014 C
44 1 307 G

69

59 - FIGURE 70

Assembling the clutch control right slider and the second register total and calculation slider.

a) Assemble the clutch control right slider 44 4 324 T which must be connected to the starting lever 44 4 019 V by means of the stud screw 926 3 17 P and proper nut 938 3 05 G. This latter must not be tightened right home.

b) The slider 44 4 324 T must be connected at the rear to the crank 44 4 325 U.

c) Assemble the second register total and calculation slider 44 4 015 R which must be connected to the bridge 44 7 095 M. Secure it with a spring clip 945 2 21 S.

60 - FIGURE 71

Assembling the sliders guide plate.

a) Assemble the sliders guide plate 44 4 043 V so that:

— its tenon **T** is placed in the proper guide made in the keyboard upper plate

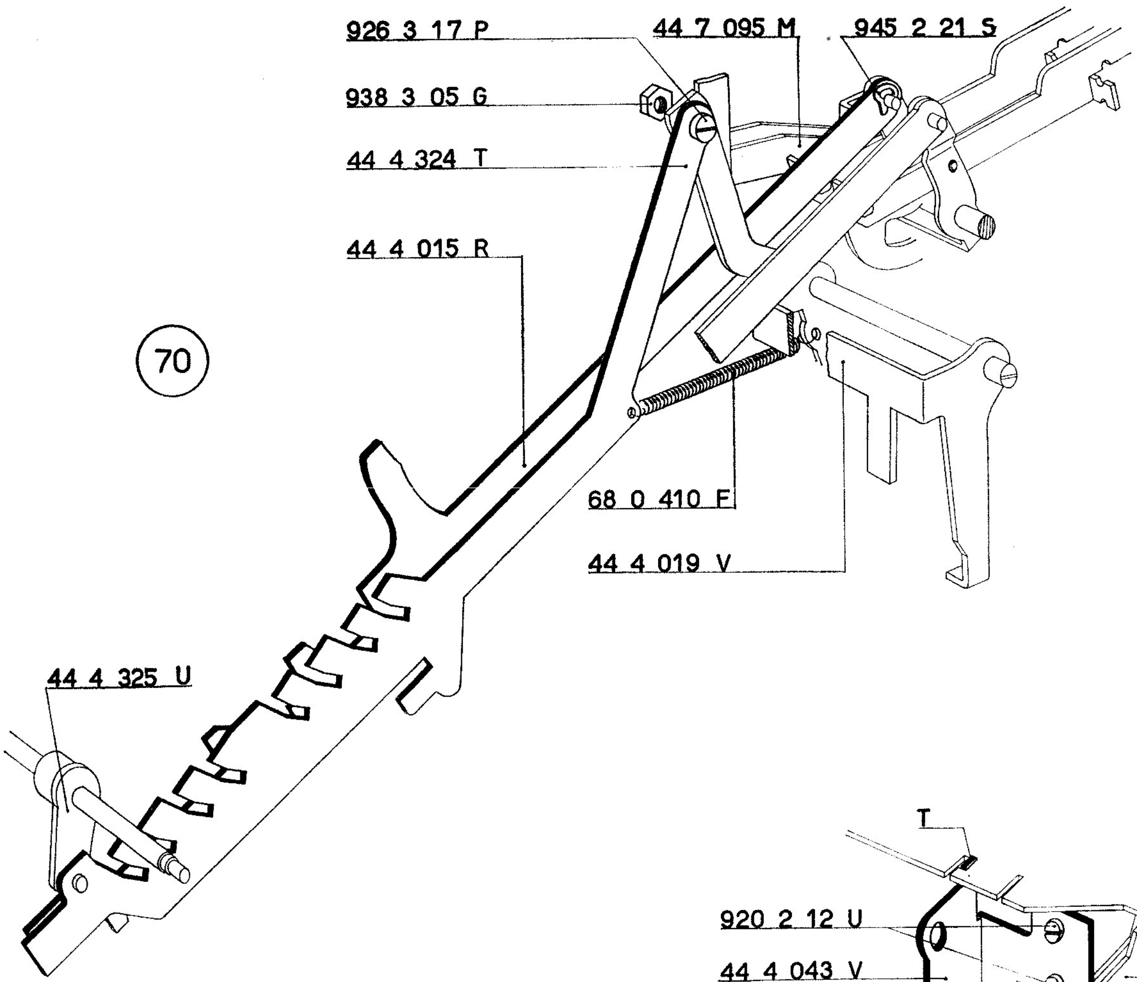
— in its guide slots are inserted the sliders 44 4 015 R, 44 4 324 T, 44 4 014 Q, 44 4 313 Y, 44 4 012 N and the tenon **T1** of the support 44 4 032 J.

Secure the small plate with two screws 920 2 12 U.

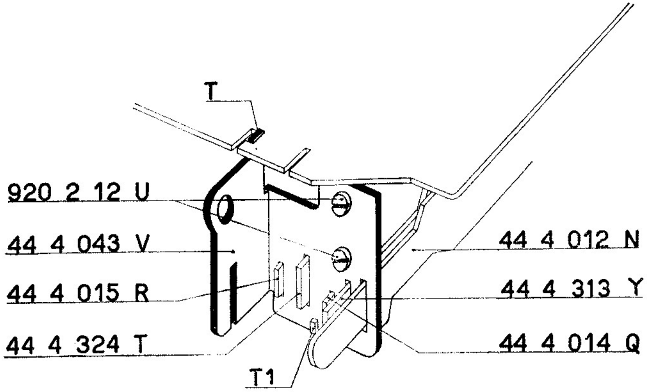
b) Hook the spring 68 0 410 F between the slider 44 4 024 J and the lever 44 4 019 V (figugre 70).

44 4 012 N	Totals universal bar slider
44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and calculation slider
44 4 019 V	Starting lever
44 4 043 V	Sliders guide plate
44 4 313 Y	Credit balance slider
44 4 324 T	Clutch control right slider
44 4 325 U	Crank for 44 4 324 T
44 7 095 M	Second register special signs selecting bridge
68 0 410 F	Spring for 44 4 019 V, 44 4 324 T
920 2 12 U	Securing screw for 44 4 043 V
926 3 17 P	Stud screw for 44 4 324 T
938 3 05 G	Nut for 926 3 17 P
945 2 21 S	Spring clip

(70)


926 3 17 P
938 3 05 G
44 4 324 T
44 4 015 R
44 7 095 M
945 2 21 S
68 0 410 F
44 4 019 V
44 4 325 U

(71)


T
920 2 12 U
44 4 043 V
44 4 015 R
44 4 324 T
T1
44 4 012 N
44 4 313 Y
44 4 014 Q

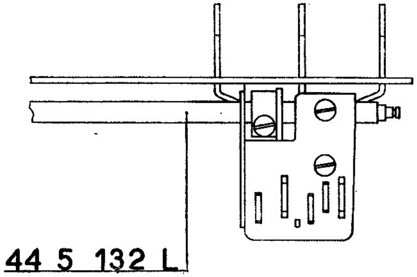
61 - FIGURES 72 - 73 - 74 - 75 - 76 - 77

Adjusting the clutch release.

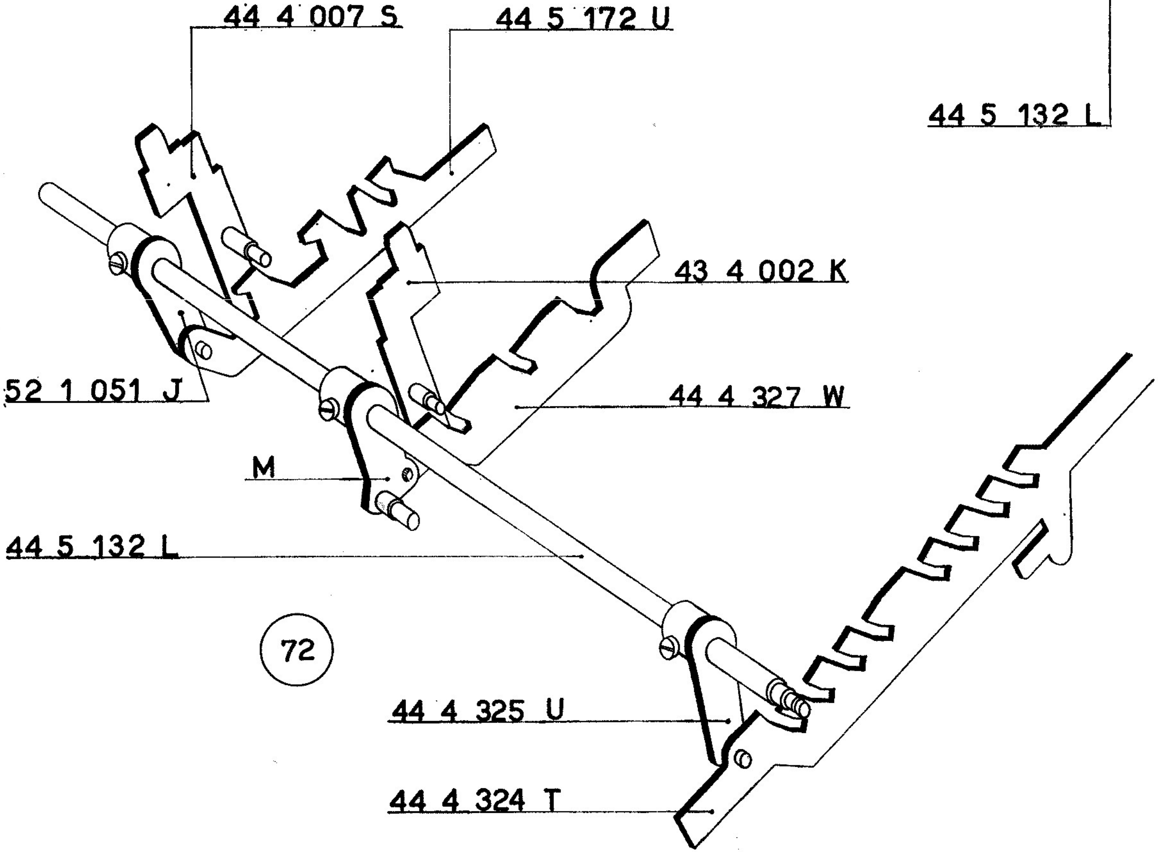
a) Loosen the screws of the crank 52 1 051 J, 44 4 325 U *and of the crank* **M** *of the slider* 44 4 327 W.

b) Push leftward the shaft 44 5 132 L *so that its spring clip moves against the keyboard right support (figure* 73*). Move rightward the crank* 44 4 325 U *to reduce to a minimum the axial play of the shaft* 44 5 132 L *(figure* 72*). Tighten the screw of the crank.*

44 4 007 S	« Division stop » key-stem
44 4 324 T	Clutch control right slider
44 4 325 U	Crank for 44 4 324 T
44 4 327 W	Clutch control left slider
44 5 132 L	Shaft of the rod control right arm
44 5 172 U	Multiplication and division current slider
43 4 002 K	« Back-space » and « clearing » key-stem
52 1 051 J	Crank


44 5 132 L

73

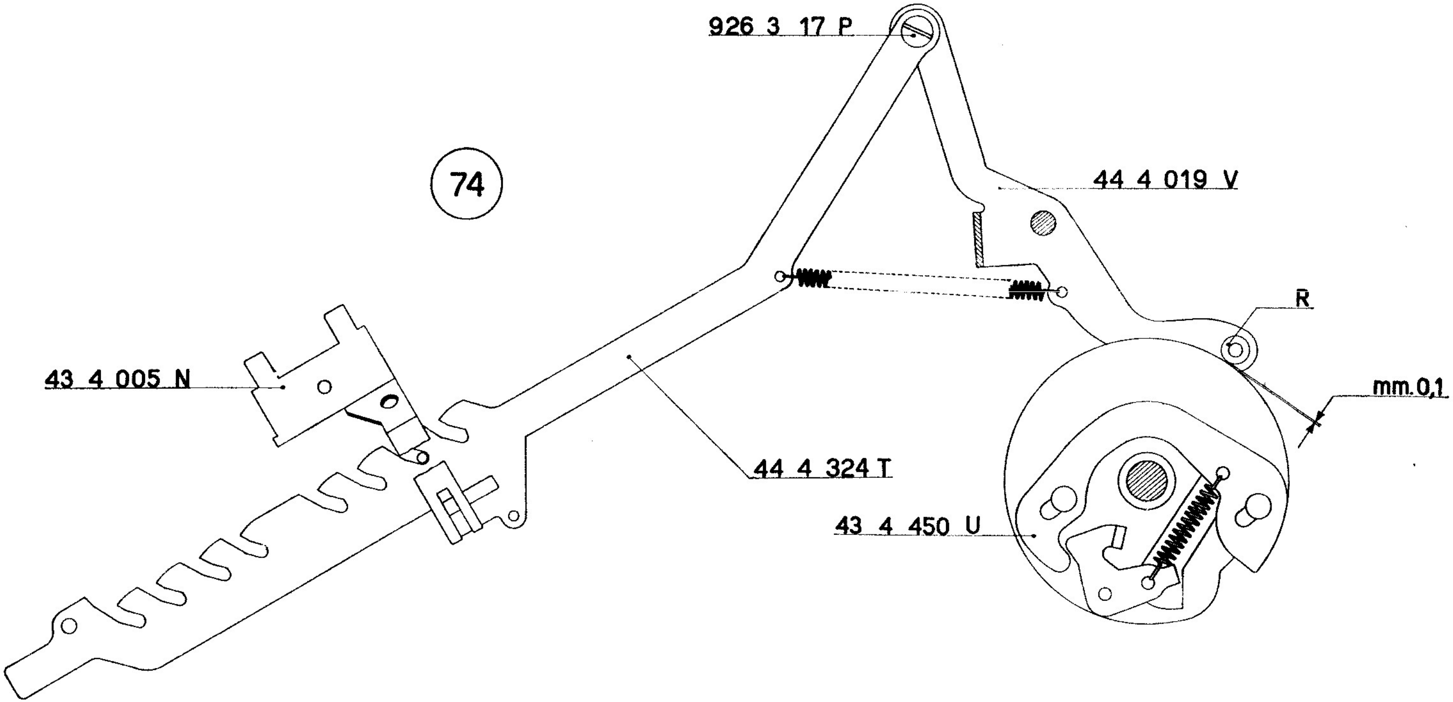

44 4 007 S
44 5 172 U
43 4 002 K
52 1 051 J
44 4 327 W
M
44 5 132 L
44 4 325 U
44 4 324 T

72

c) Depress the second register «add» key-stem (figure 74) *and rotate the main shaft so that the roller* **R** *of the starting lever* 44 4 019 V *moves to the circular zone of the disc* 43 4 450 U. *With the key all the way down we should obtain the clearance of* 0.1 *mm. shown in the same figure. The condition is obtained by varying the meshing between the slider* 44 4 324 T *and the starting lever* 44 4 019 V; *then tighten the nut of the stud-screw* 926 3 17 P.

d) Move the main shaft to rest. Make the checking of the adjustment described at point c) *by depressing successively the other calculation keys and the four total keys.*

44 4 019 V	Starting lever
44 4 324 T	Clutch control right slider
43 4 005 N	Second register « add » key-stem
43 4 450 U	Disc with starting plate and dragging tooth
926 3 17 P	Stud-screw


74
926 3 17 P
44 4 019 V
R
43 4 005 N
mm.0,1
44 4 324 T
43 4 450 U

e) Push forward the slider 44 4 024 J *and rotate the main shaft so that the roller* **R** *of the starting lever* 44 4 019 V *moves to the circular zone of the disc* 43 4 450 U *(figure* 74*). Depress all the way down the « clearing » key-stem* 43 4 002 K *(figure* 75*); check that the slider* 44 4 327 W *is parallel to the proper keys and then tighten the screw of the crank* **M***. Check the condition described at point* c).

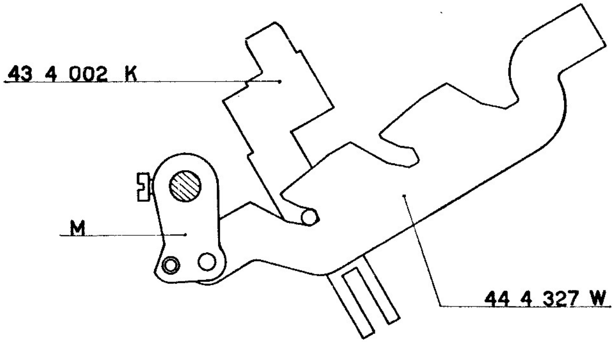
f) Push forward the slider 44 4 024 J *and rotate the main shaft so that the roller* **R** *of the starting lever* 44 4 019 V *moves to the circular zone of the disc* 43 4 450 U *(figure* 74*). Depress all the way down the « non-add » and « division stop » key-stem* 44 4 007 S *(figure* 76*) and push rearward the slider* 44 5 172 U *which should be parallel to the proper keys. Tighten the screw of the crank* 52 1 051 J*. Check the condition described at point* c).

Move the main shaft back to rest. Depress the « non-add » and « division stop » key 44 4 007 S *(figure* 77*) which pivot should enter smoothly on the slider skid. A same check should be done for the « division control » key.*

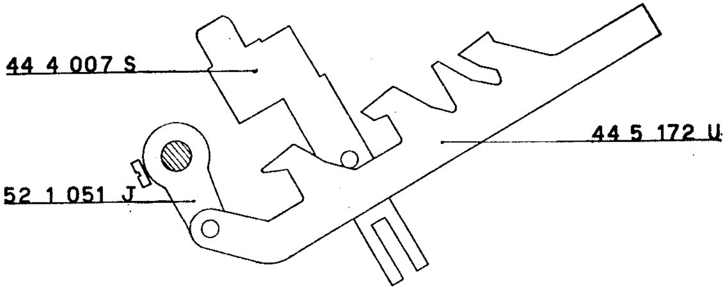
Check again if necessary the precedent adjustment.

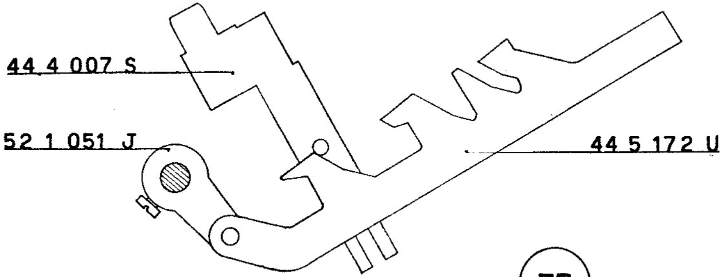
44 4 007 S	« Non-add » and « division stop » key-stem
44 4 327 W	Clutch control left slider
44 5 172 U	Multiplication and division current slider
43 4 002 K	« Back-space » and « clearing » key-stem.
52 1 051 J	Crank

75


43 4 002 K
M
44 4 327 W

76


44 4 007 S
52 1 051 J
44 5 172 U


44 4 007 S
52 1 051 J
44 5 172 U

77

62 - FIGURE 78

Assembling the front add key.

a) Assemble on the stem 43 4 341 S the appropriate key 43 4 342 T.

b) Assemble the front add key-stem now prepared which should take the position illustrated in the figure. In the slot of the key-seat place the pivot **P** of the crank **M** of the slider 44 4 327 W.

c) On the support 43 1 017 E assemble, by means of the stud-screw 926 3 33 P and the nut 938 3 05 G, the transmission lever 44 4 346 H. Secure it to the key-stem 43 4 341 S by means of a spring clip 945 2 21 S. *Check that the movement of the key-stem is perfect.*

d) Between the transmission lever 44 4 346 H and the keyboard plate, hook the spring 40 8 052 B.

44 4 327 W	Clutch control left slider
44 4 346 H	Front add key transmission lever
40 8 052 B	Spring for 44 4 346 H
43 1 017 E	Column indicator drum support
43 4 341 S	Front add key-stem

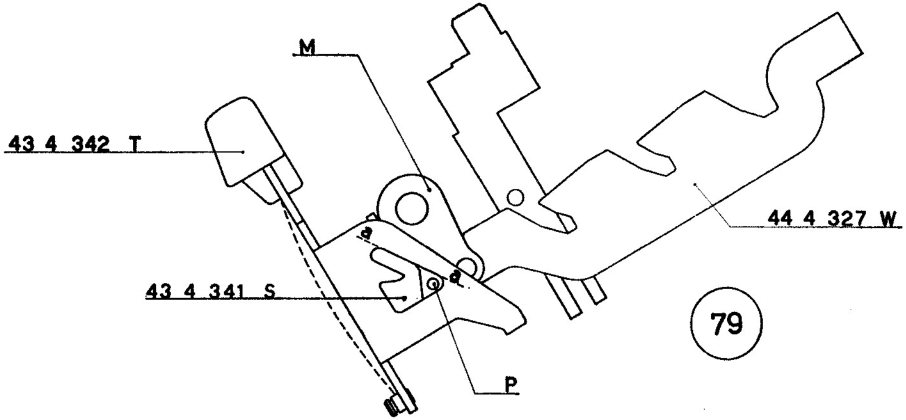
63 - FIGURE 79

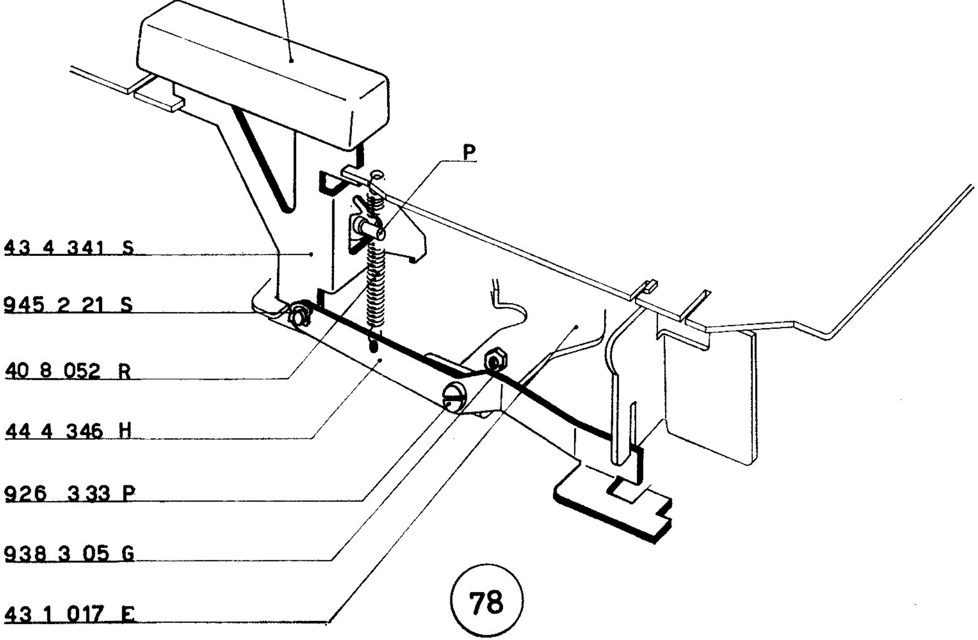
Adjusting the front add key.

Depress slowly the key 43 4 342 T; *after having released the starting lever, it should still have a little void travel. If this condition is not obtained act on the same key, bending it a little in the direction shown by the dotted line. In this may, the inclinated plane* **a a** *will meet the pin P of the crank* **M** *of the slider* 44 4 327 W *in anticipation.*

Check that the movement of the stem 43 3 341 S *is perfect.*

43 4 342 T	Front add key
926 3 33 P	Stud-screw for 44 4 346 H
938 3 05 G	Nut for 926 3 33 P
945 2 21 S	Spring clip for 44 4 346 H


M
43 4 342 T
44 4 327 W
a
a
43 4 341 S
P
79


43 4 342 T
P
43 4 341 S
945 2 21 S
40 8 052 R
44 4 346 H
926 3 33 P
938 3 05 G
43 1 017 E
78

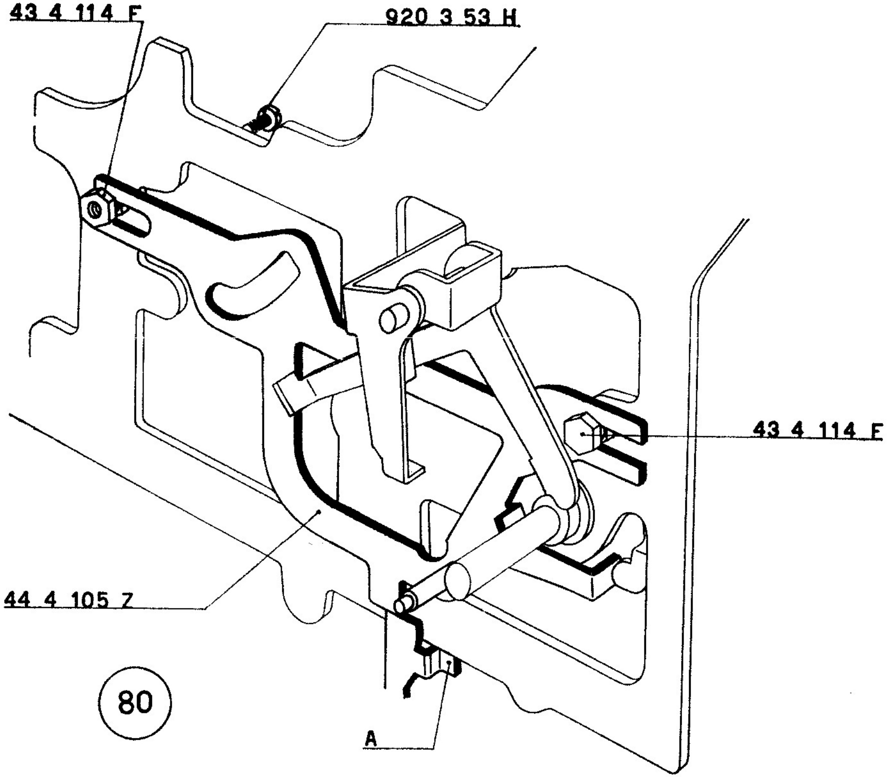
64 - FIGURE 80

Assembling the control plate 44 4 105 Z.

On the right external side-plate of the machine assemble, by means of a second nut 43 4 114 F and screw 920 3 53 H, the control plate 44 4 105 Z.

Act on the lower extension **A** *to leave to the plate a very little play.*

44 4 105 Z	Control plate
43 4 114 P	Special nut
920 3 53 H	Set-screw for 43 4 114 P


43 4 114 F
920 3 53 H
43 4 114 F
44 4 105 Z
A

80

65 - FIGURE 81

Assembling the current-keyboard reciprocal locking rocker; the cypher entry control bridge and the totals control arm.

a) In the appropriate guide hole made in the right external side-plate insert correctly orientated the shaft 44 4 363 A on which should be placed:

— the cypher entry control bridge 44 6 075 X;

— the servomechanism control arm 44 5 127 P with the screw 920 3 02 F;

— a collar 942 4 32 W with the screw 925 3 22 K;

— the current-keyboard reciprocal locking rocker 44 2 316 Z.

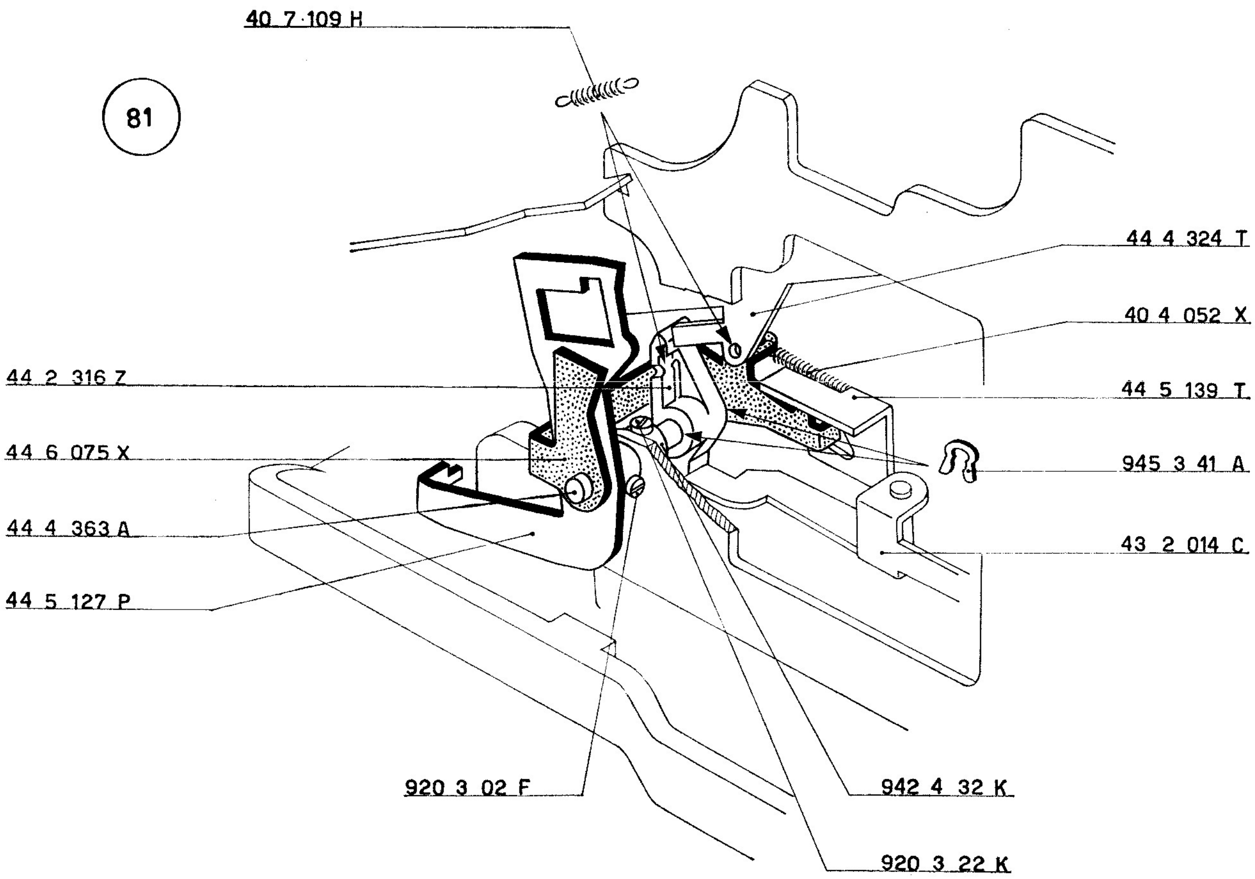
The end of the shaft should therefore be placed in the guide hole made on the lower stay of the slider 44 2 320 H (not visible in the figure).

b) In the proper seats of the shaft 44 4 363 A place two spring clips 945 3 41 A.

c) Hook the spring 40 7 109 H between the rocker 44 2 316 Z and the slider 44 4 324 T.

d) Hook the spring 40 4 052 X between the bridge 44 6 075 X and the cypher entry plate 44 5 139 T.

44 2 316 Z	Current-keyboard reciprocal locking rocker
44 4 324 T	Clutch control right slider
44 4 363 A	Shaft
44 5 127 P	Servomechanism-totals control arm
44 5 139 T	Cypher entry plate
44 6 075 X	Cypher entry control bridge
40 4 052 X	Spring for 44 6 075 X
40 7 109 H	Spring for 44 2 316 Z - 44 4 324 T
43 2 014 C	Current-keyboard reciprocal locking lever
920 3 02 F	Screw for 44 5 127 P
925 3 22 K	Screw for 942 3 32 K
942 4 32 K	Collar
945 3 41 A	Spring clip


81
40 7 109 H
44 4 324 T
40 4 052 X
44 2 316 Z
44 5 139 T
44 6 075 X
945 3 41 A
44 4 363 A
43 2 014 C
44 5 127 P
920 3 02 F
942 4 32 K
920 3 22 K

66 - FIGURE 82

Preparing the slide.

The slide unit is riveted: its code number is 44 2 334 T and includes all the parts illustrated in the figure.

We note among the others the leaf-spring 43 2 064 N and the left leaf-spring 43 2 069 T. This latter doesn't include the small leaf-spring since the stop **S** has a particular spring. The **S1** is a fixed stop.

To place the leaf-springs between the stops it is necessary to use two very thin plates **L** (0.05 mm. thick) which will be removed afterward.

The spring 40 2 145 X is hooked to the cypher plate **D**.

The leaf-springs 43 2 064 N and 43 2 069 T are held by the pivot-wire 43 2 067 R which ends are flattened to prevent them moving off.

44 2 043 T	Slide escapement fixed dog
44 2 052 U	Slide antirebounding pawl
44 2 334 T	Slide complete unit
44 6 058 E	Antirebounding pawl stop ring
40 2 145 X	Spring for slide rack
40 3 016 J	Spring for 44 2 052 U
42 2 042 N	Spring for 43 2 074 Q and 44 2 043 T
43 2 064 N	Slide stops leaf-spring

67 - FIGURE 83

Preparing the slide guide and escapement plate.

a) In the appropriate guide holes of the slide guide and escapement plate 43 2 075 R insert the shaft 43 2 076 J on which are placed:

— the slide stop dog 43 2 074 Q
— the slide escapement fixed dog 44 2 043 T
— the slide antirebounding pawl 44 2 052 U with the ring 44 6 058 E on which should be screwed the screw 920 3 02 F.

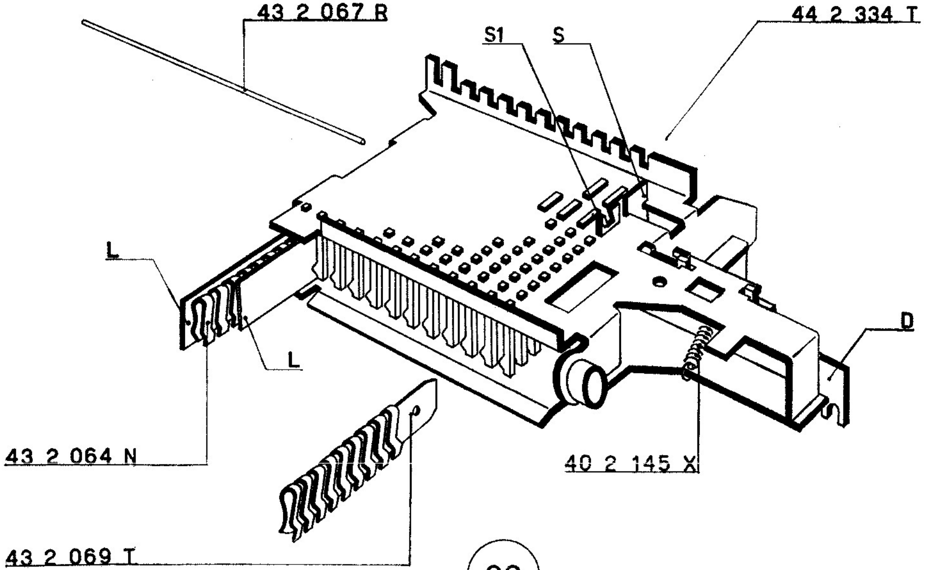
The extensions of the two dogs 43 2 074 Q and 44 2 043 T should be inserted in the appropriate guide slots of the plate 43 2 075 R.

b) Hook the springs 42 2 042 N between the dogs 43 2 074 Q - 44 2 043 T and the plate 43 2 075 R.

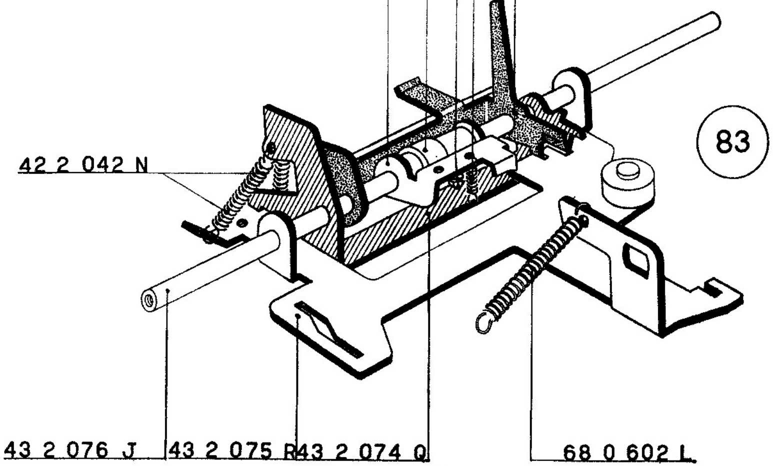
c) Hook an end of the spring 40 3 016 J to the pawl 44 2 052 U.

d) Hook an end of the spring 68 0 602 L to the plate 43 2 075 R.

43 2 067 R	Stops leaf-springs securing shaft
43 2 069 T	Is left leaf-spring of the slide stops
43 2 074 Q	Slide stop dog
43 2 075 R	Slide guide and escapement plate
43 2 076 J	Escapement shaft
68 0 602 L	Spring for 44 2 052 U
920 3 02 F	Screw for 44 6 058 E


43 2 067 R
S1
S
44 2 334 T
L
L
D
43 2 064 N
40 2 145 X
43 2 069 T

82


44 2 052 U
44 6 058 E
920 3 02 F
40 3 016 J
44 2 043 T
42 2 042 N
43 2 076 J
43 2 075 R
43 2 074 Q
68 0 602 L

83

68 - FIGURE 84

Assembling the stops clearing plate.

Assemble the stops clearing plate 44 2 079 F which should be guided by the three pivots 44 2 081 J.

69 - FIGURES 85 and 86

Assembling the slide unit.

a) Move the racks to nine.

b) Place the slide unit as illustrated in the figure 85. Place in the arm **B** the fork of the lever 43 2 085 C.

c) Insert in the appropriate guide hole of the small plate **P** fixed to the right external side-plate, the slide guide shaft 44 2 038 W (figure 86). It should be inserted in the appropriate holes of the slide and then placed in the guide hole of the small plate fixed on the left internal side-plate.

d) Secure the shaft 44 2 038 W by means of the washer 44 2 053 V and the screw 925 3 51 Y (figure 86).

e) Hook the spring 40 3 021 P to the stops clearing plate 44 2 079 F.

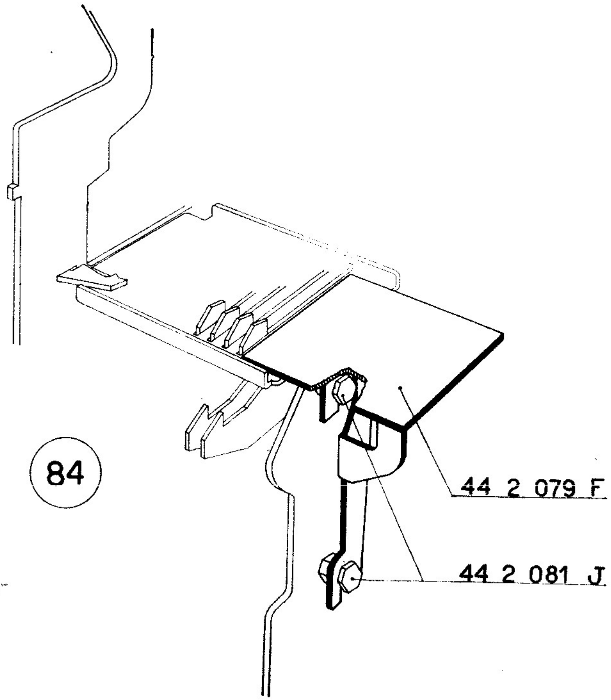
70 - FIGURE 85

Assembling the slide rubber stop.

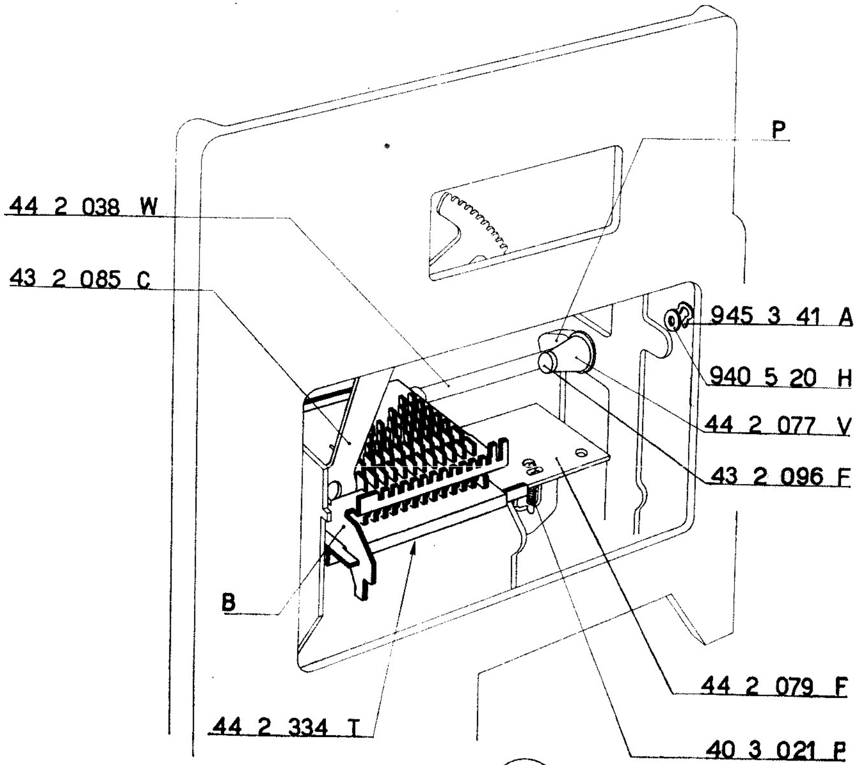
On the right external side-plate of the machine assemble the slide rubber stop 44 2 077 V by means of the pivot 43 2 096 F and of the washer 940 5 20 H. Secure the pivot by means of a spring clip 945 3 41 A.

44 2 038 W	Slide shaft
44 2 053 V	Washer securing the slide shaft
44 2 077 V	Slide rubber stop
44 2 079 F	Stops clearing plate
44 2 081 J	Stops clearing plate guide pivot
44 2 334 T	Complete slide unit

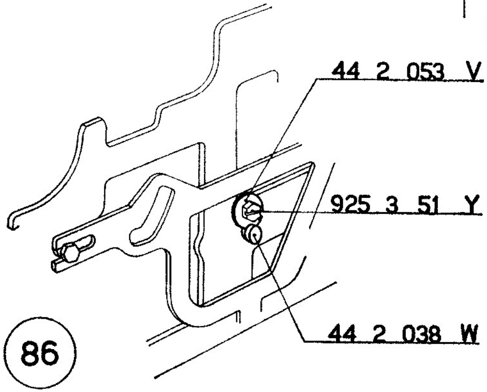
40 3 021 P	Spring for 44 2 079 F
43 2 085 C	Slide transmission lever
43 2 096 F	Slide rubber stop carrying pivot
925 3 51 Y	Set-screw for 44 2 053 V
940 5 20 H	Washer for 43 2 096 F
945 3 41 A	Spring clip for 43 2 096 F


44 2 079 F
44 2 081 J

84


P
44 2 038 W
43 2 085 C
945 3 41 A
940 5 20 H
44 2 077 V
43 2 096 F
B
44 2 079 F
44 2 334 T
40 3 021 P

85


44 2 053 V
925 3 51 Y
44 2 038 W

86

71 - FIGURE 87

Assembling the escapement unit.

a) Assemble the escapement unit as shown in the figure.

See that:

— the arm **A** of the fixed dog 44 2 043 T is placed behind the pivot **P** of the universal bar 44 2 019 T

— the roller **R** of the plate 43 2 075 R is placed between the two slide plates

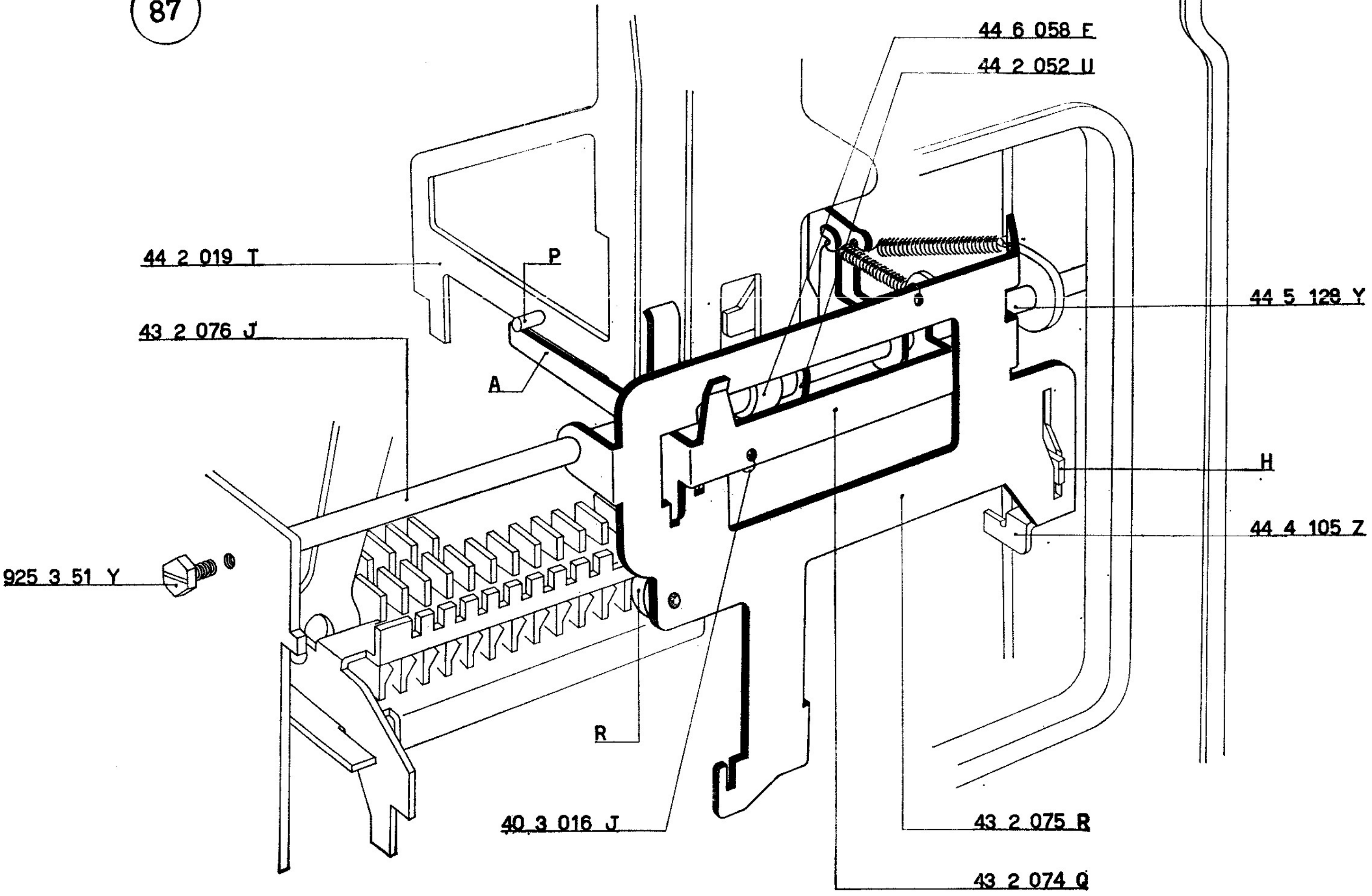
— the extension **H** of the control plate 44 4 105 Z is placed in the slot of the plate 43 2 075 R.

b) Secure the shaft 43 2 076 J by means of a screw 925 3 51 Y and the small shaft 44 5 128 Y. This latter should pass through the hole drilled on the bump of the base.

c) Hook the spring 40 3 016 J of the pawl 44 2 052 U to the dog 43 2 074 Q.

44 4 019 T	Keyboard universal bar plate
44 2 052 U	Slide antirebounding pawl
44 4 105 Z	Control plate
44 5 128 Y	Servomechanism hook pivot
44 6 058 E	Antirebounding pawl stop ring
40 3 016 J	Spring for 43 2 074 Q - 44 2 052 U
43 2 074 Q	Slide stop dog
43 2 075 R	Slide guide and escapement plate
43 2 076 J	Escapement shaft
925 3 51 Y	Set-screw for 53 2 076 J

87


44 6 058 F
44 2 052 U
44 2 019 T
P
43 2 076 J
A
44 5 128 Y
H
44 4 105 Z
925 3 51 Y
R
40 3 016 J
43 2 075 R
43 2 074 Q

72 - FIGURE 88

Preparing the retaining teeth carrying frame.

a) Assemble on the retaining teeth carrying frame 44 4 425 R the leaf-spring 43 4 121 E which must be guided by the two tenons **T** of the frame.

b) Insert the shaft 44 4 428 U and place on it:

— the small tube 44 4 137 Q
— the 13 retaining teeth 43 4 122 F
— the small tube 44 4 438 W.

Secure the shaft by means of two spring clips 945 2 30 F.

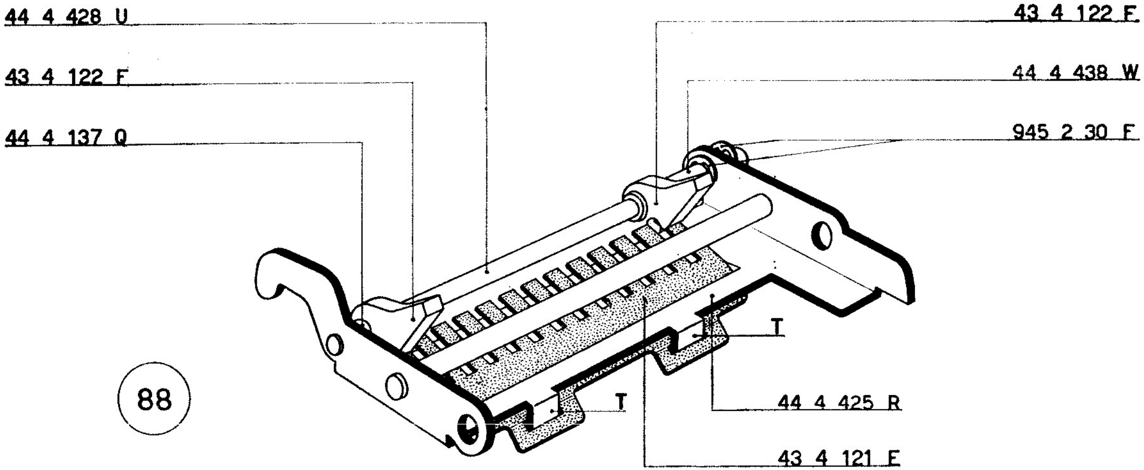
73 - FIGURE 89

Preparing the quotient multiplication racks stabilizing teeth unit.

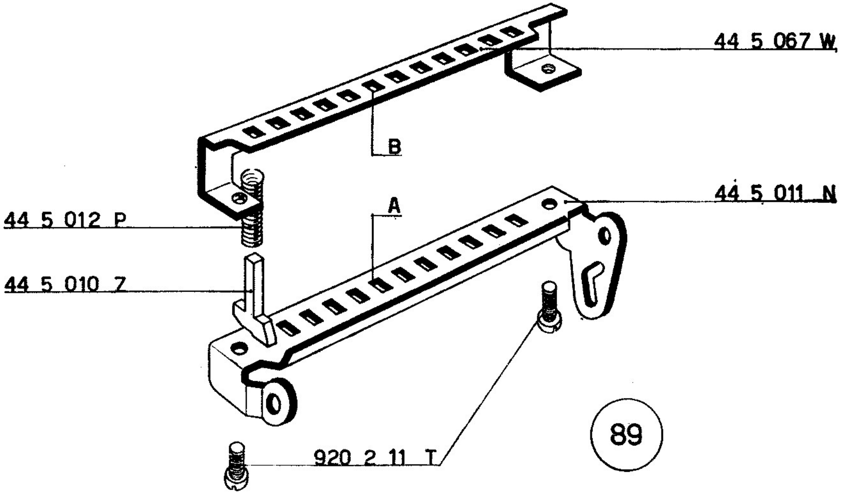
a) In the twelve guide slots of the frame 44 5 011 N place as many stabilizing teeth 44 5 010 Z. On each teeth place the proper spring 44 5 012 P.

b) On the frame 44 5 011 N place the frame 44 5 067 W which slots **B** should guide the teeth 44 5 010 Z. Secure by means of two screws 920 2 11 T.

44 4 137 Q	Tube of the retaining teeth carrying frame
44 4 425 R	Retaining teeth carrying frame
44 4 428 U	Retaining teeth shaft
44 4 438 W	Retaining teeth carrying frame tube
44 5 010 Z	Racks stabilizing tooth
44 5 011 N	Stabilizing teeth frame (front part)
44 5 012 P	Spring for the stabilizing tooth
44 5 067 W	Stabilizing teeth frame (rear part)
43 4 121 E	Racks retaining teeth leaf-spring
43 4 122 F	Racks retaining tooth
920 2 11 T	Securing screw for 44 5 067 W
945 2 30 F	Spring clip for 43 4 122 F


44 4 428 U
43 4 122 F
44 4 137 Q
43 4 122 F
44 4 438 W
945 2 30 F
T
T
44 4 425 R
43 4 121 E

88


44 5 067 W
B
44 5 011 N
A
44 5 012 P
44 5 010 Z
920 2 11 T

89

74 - FIGURES 90 and 91

Assembling the memory unit, the memory racks stabilizing unit and the racks stops unit.

N.B. — The memory unit 44 5 518 X is grounded after it has been assembled. Consequently, this unit is supplied complete only. For better understanding we have illustrated only one of the twelve racks.

a) On the memory unit 44 5 518 X assemble the stabilizing unit prepared at paragraph 73. Secure it by means of a spring clip 945 2 21 S (figure 91).

b) Move the racks to « 9 ».

c) Between the two internal side-plates of the machine, place the racks stops unit prepared at paragraph 72 and the memory unit 44 5 518 X.

See that:

— the extension **A** of the frame 44 4 425 R is inserted in the proper guide slot of the small plate 43 2 075 R (figure 90)

— the shaft 44 4 428 U is placed in the proper opening made on the right internal side-plate of the machine (figure 90)

— in the slot of the frame 44 5 011 N is inserted the pivot 50 6 007 Z assembled on the right internal side-plate of the machine (figure 90)

— the extension **B** of the memory unit it placed in the proper guide slot of the comb 44 3 014 P (figure 91).

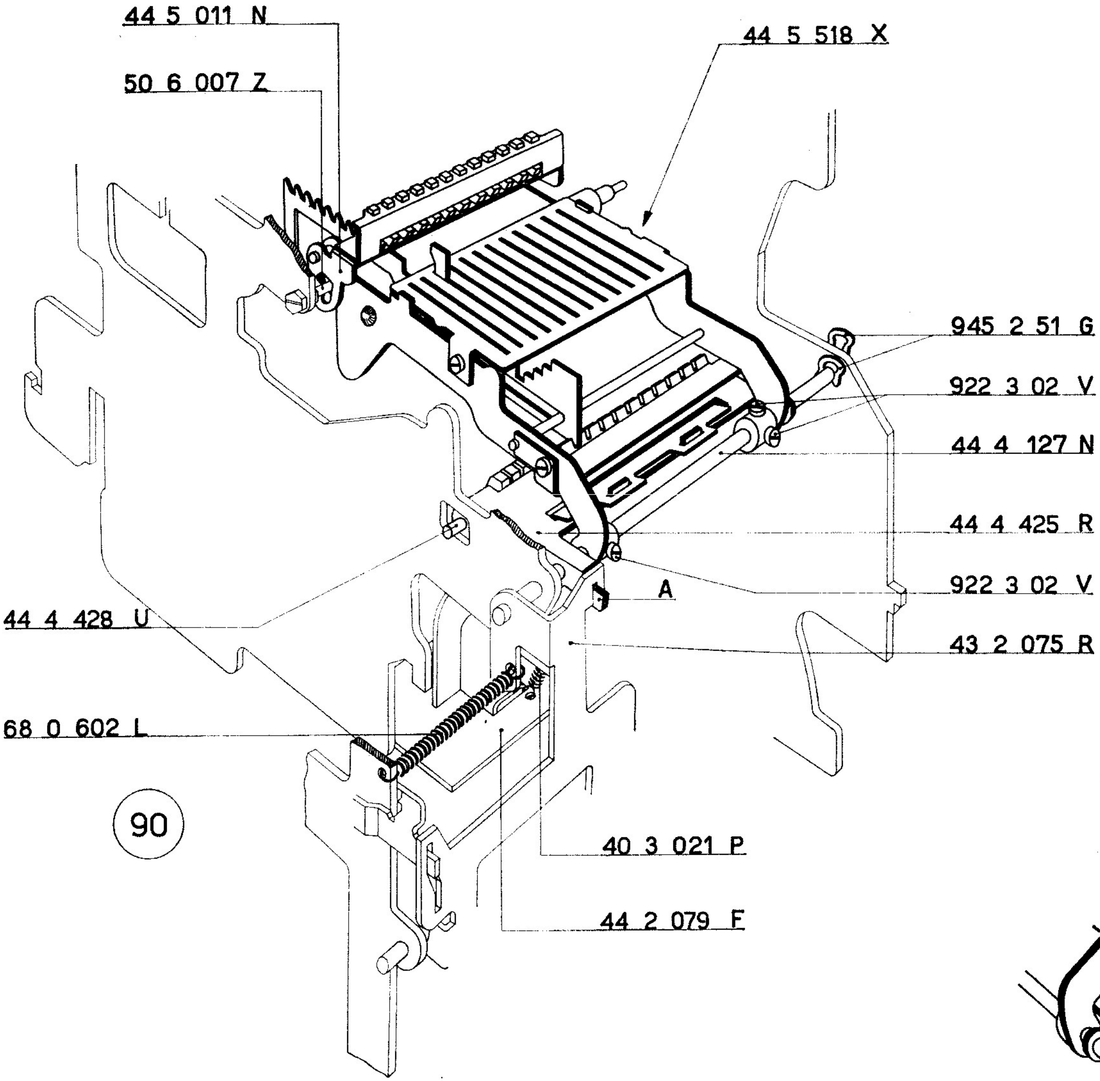
d) Pivot the two units assembled and the small plate 43 2 075 R bl means of the shaft 44 4 127 N which should be secured by means of two spring clips 945 2 51 G.

e) Hook the spring 68 0 602 L to the right external side-plate of the machine.

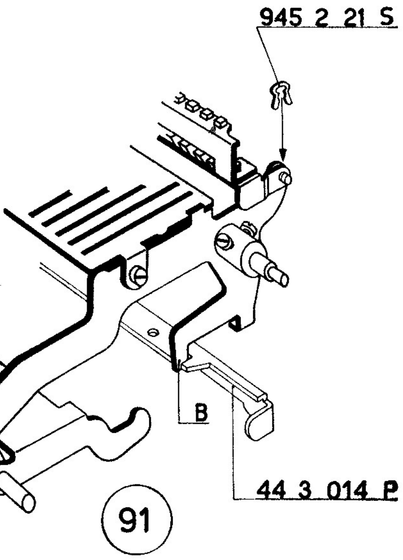
f) Hook the spring 40 3 021 P (already hooked to the stop clearing plate 44 2 079 F) to the frame 44 4 425 R.

g) *The axial position of the memory unit is established by the comb* 44 3 014 P (*figure* 91). *Two spring clips* 945 2 51 G *allow a little axial play to the shaft* 44 4 127 N. *Move the shaft to divide this play and then tighten right home the four screws* 922 3 02 V *which secure the memory unit to the shaft.*

44 2 079 F	Stops clearing plate
44 3 014 P	Racks guide rear comb
44 4 127 N	Shaft of the memory unit and retaining teeth carrying frame
44 4 425 R	Retaining teeth carrying frame
44 4 428 U	Retaining teeth shaft
44 5 011 N	Stabilizing teeth frame (front part)
44 5 518 X	Memory unit
40 3 021 P	Spring for 44 2 079 F - 44 4 425 R
43 2 075 R	Slide guide and escapement plate
50 6 007 Z	Special screw
68 0 602 L	Spring for 43 2 075 R
922 3 02 V	Securing screw for memory unit
945 2 21 S	Spring clip
945 2 51 G	Spring clip


44 5 011 N
50 6 007 Z
44 5 518 X
945 2 51 G
922 3 02 V
44 4 127 N
44 4 425 R
922 3 02 V
A
43 2 075 R
44 4 428 U
68 0 602 L
40 3 021 P
44 2 079 F

90


945 2 21 S
B
44 3 014 P

91

75 - FIGURE 92

Final adjustment of the racks guide lower comb.

a) Move the two registers to zero.

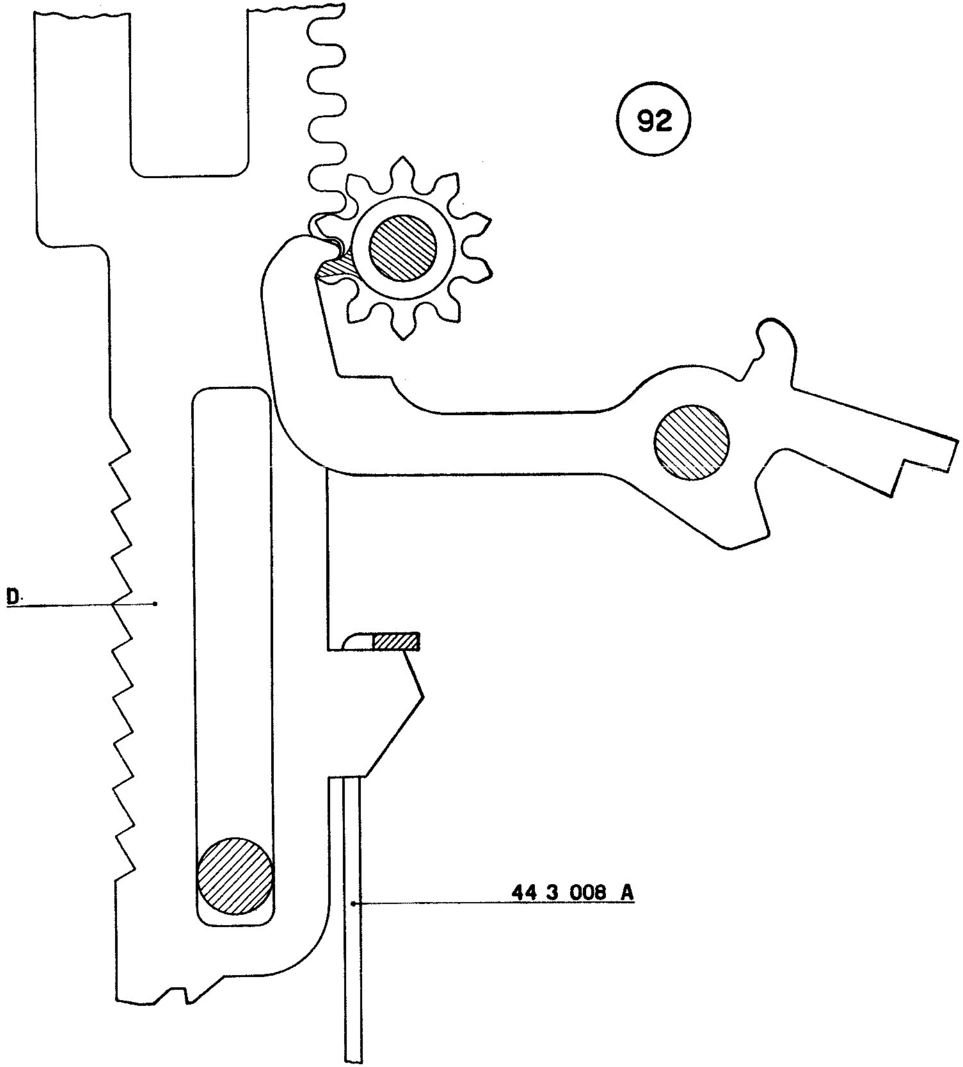
b) Move the racks **D** *to « 9 » that is in contact with the upper bent of the comb* 44 3 008 A.

c) Engage one of the registers with the racks. These latters should not be lowered; we tolerate that only some of them move down by 0.1 *mm.*

This is obtained by adjusting vertically the position of the comb 44 3 008 A.

N.B. — This condition should be checked with the other register also.

If there is a difference between a register and the other, adjust the register which restores too much the racks.


92
D
44 3 008 A

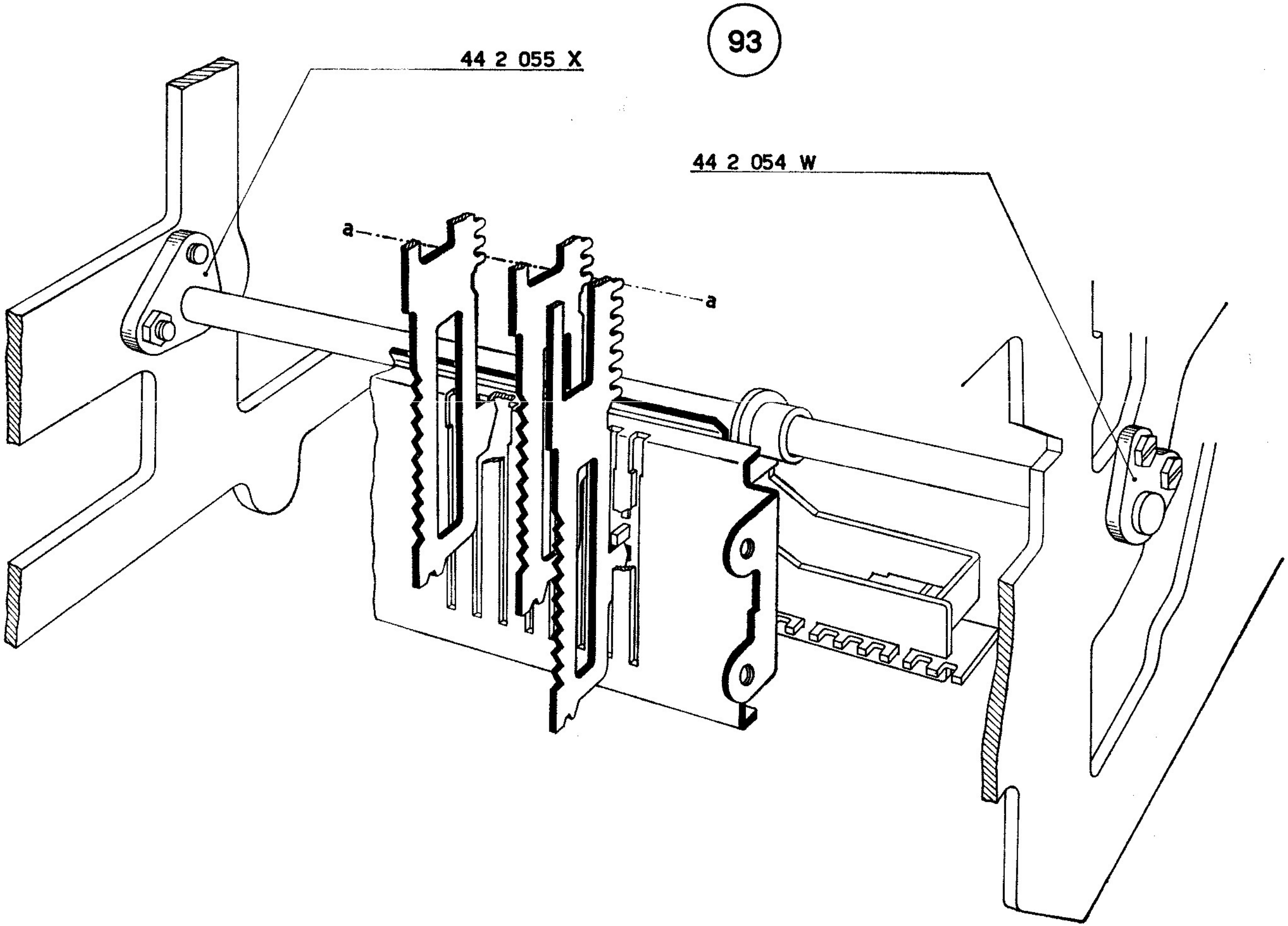
76 - FIGURE 93

Adjusting the slide vertically.

a) Enter in the slide: 393939393939.

b) Make the racks go up and check that the teeth of those moved up to « 3 » *are perfectly aligned with the teeth of those moved up to* « 9 » *(line* **a-a***).*

c) This conditions is obtained by moving suitably the two small plates 44 2 055 X *and* 44 2 054 W.


93
44 2 055 X
44 2 054 W
a
a

77 - FIGURE 94

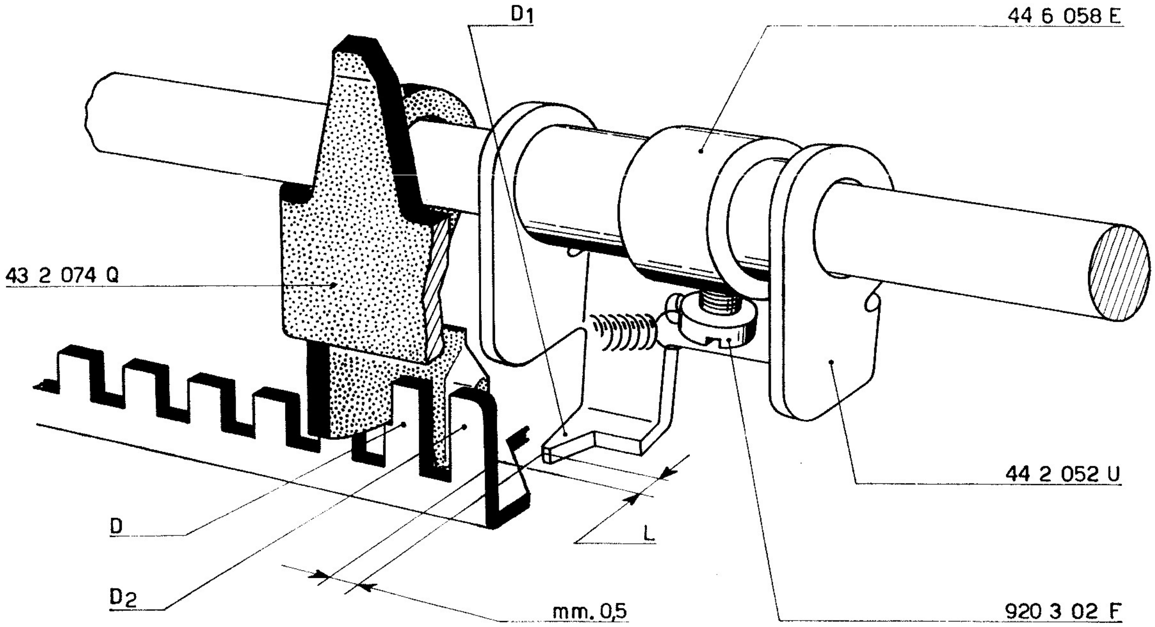
N.B. — To adjust the escapement it is necessary to exclude the slide antirebounding pawl during division. We suggest you therefore to move the slide to the end of its travel, that is with the dog **D** *of its racks engaged and held by the escapement movable dog* 43 2 074 Q.

In these conditions adjust the axial position of the ring 44 6 058 E *to obtain the reading of* 0.5 *mm. between the dog* **D1** *of the pawl* 44 2 052 U *and the dog* **D2** *of the slide rack.*

Rotate also the ring 44 6 058 E *so that its screw* 920 3 02 F *moves the dog* **D1** *away from the slide by a clearance* **L.**

In this way the slide rack will not be interfered by the antirebounding pawl. It is naturally a temporary position.

94


D1
44 6 058 E
43 2 074 Q
44 2 052 U
D
L
D2
mm. 0,5
920 3 02 F

78 - FIGURE 95

Adjusting the escapement fixed dog.

a) Move the main cam to rest.

b) Check that there is a clearance of 0.2 *mm. between the escapement fixed dog* 44 2 043 T *and the rack* **D** *of the slide. Act if necessary on the arm* **B** *of the dog which is in contact with the pivot* **P** *of the bar* 44 2 019 T.

44 2 019 T	Keyboard universal bar plate
44 2 043 T	Slide escapement fixed dog

79 - FIGURES 96 and 97

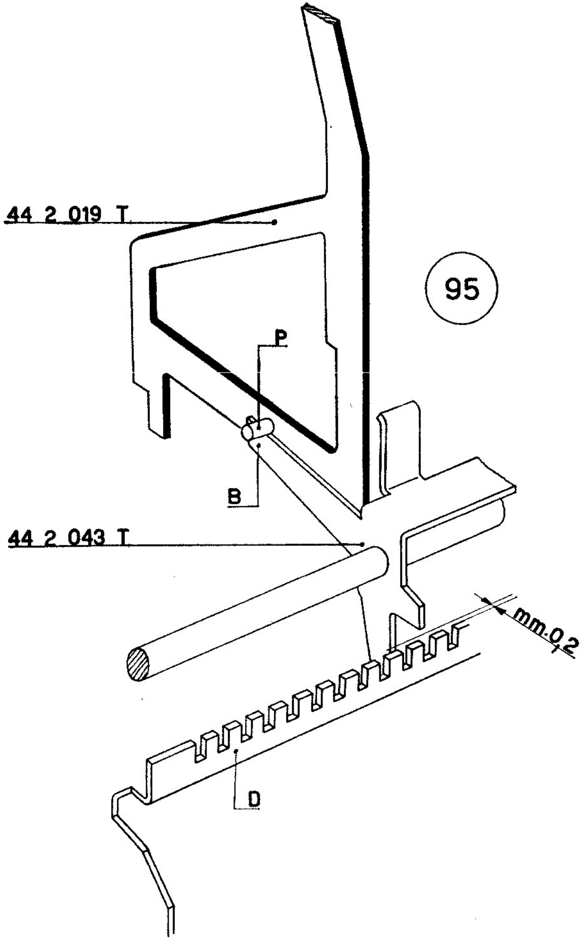
Adjusting the slide stop dog.

a) Move the main cam to rest.

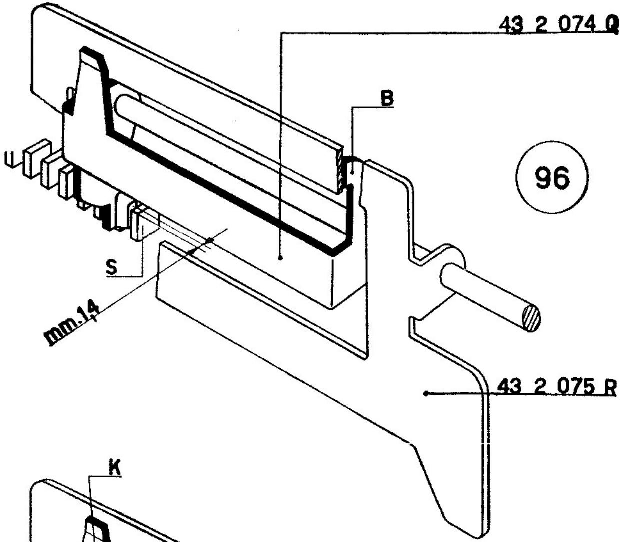
b) Check that the slide stop dog 43 2 074 Q *is engaged with the stops* **S** 1.4 *mm. deep. (figure* 96*). The engagement depth depends upon the arm* **B** *of the dog* 43 2 074 Q *which rests on the small plate* 43 2 075 R.

c) Rotate the dog 43 2 074 Q *so that its extension* **K** *rests on the small plate* 43 2 075 R. *In these conditions we should have the clearance of* 0.2 *mm. (minimum value) shown in the figure* 97. *Act if necessary on the same extension* **K**.

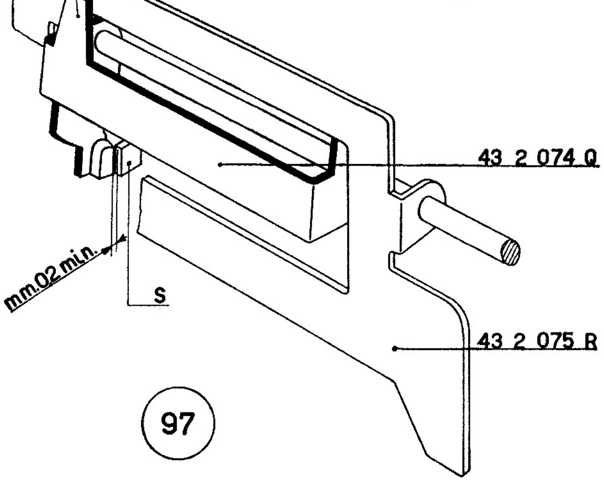
43 2 074 Q	Slide stop dog
43 2 075 R	Slide guide and escapement plate


44 2 019 T
P
B
44 2 043 T
mm.0,2
D

95


43 2 074 Q
B
S
mm.14
43 2 075 R

96


K
43 2 074 Q
mm.0,2 min.
S
43 2 075 R

97

80 - FIGURES 98 and 99

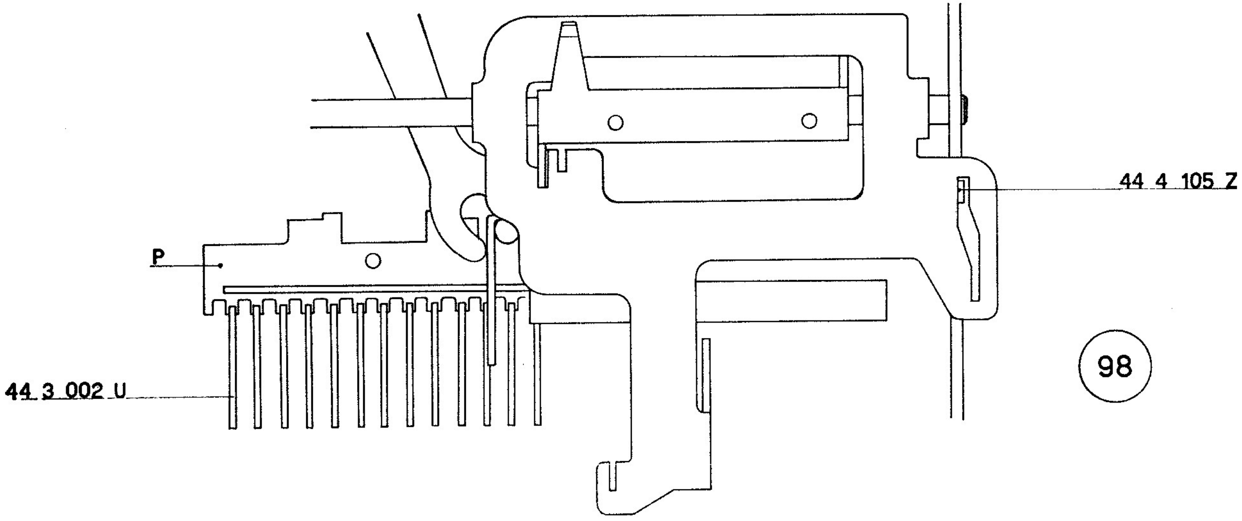
Adjusting the lateral of the slide.

a) With the control plate 44 4 105 Z *at rest, all the thickness of the racks* 44 3 002 U *should be engaged with the cypher plate teeth* **P** *(figure* 98)..

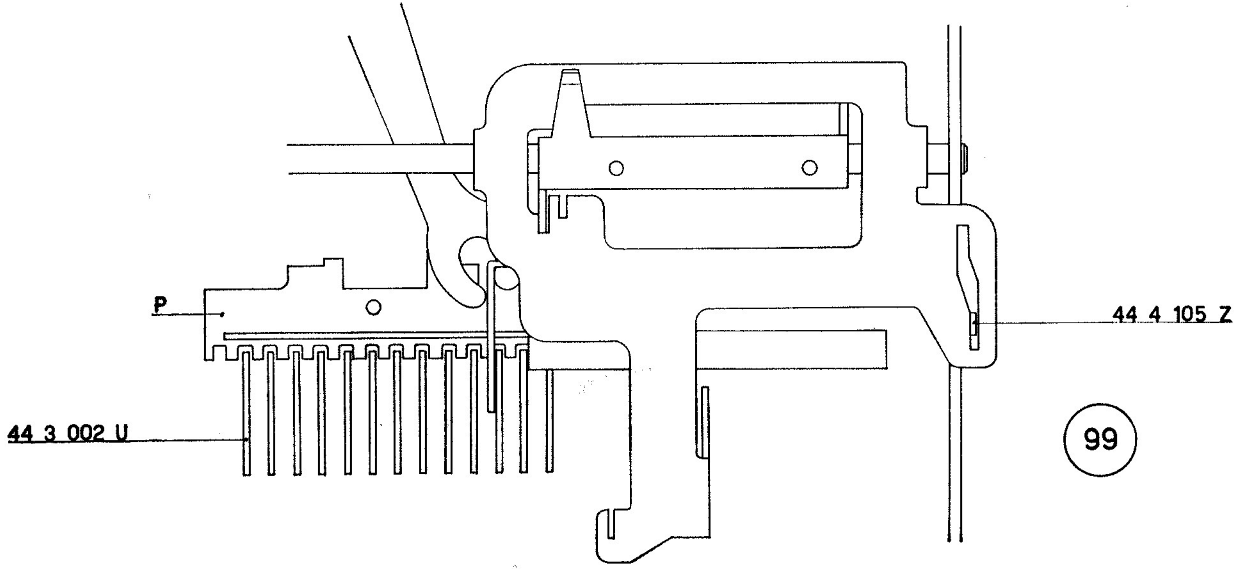
b) With the control plate 44 4 105 Z *at work (that is pushed toward the rear of the machine), the racks* 44 3 002 U *should be centered with respect to the openings of this plate* **P** *(figure* 99)..

c) The two conditions are obtained by acting suitably on the same 44 4 105 Z *which establishes the lateral position of the slide.*

44 3 002 U	Main rack
44 4 105 Z	Control plate


44 4 105 Z
P
44 3 002 U

98


P
44 4 105 Z
44 3 002 U

99

81 - FIGURE 100

Adjusting the hooking of the slide at maximum restoring.

a) Move the slide to rest.

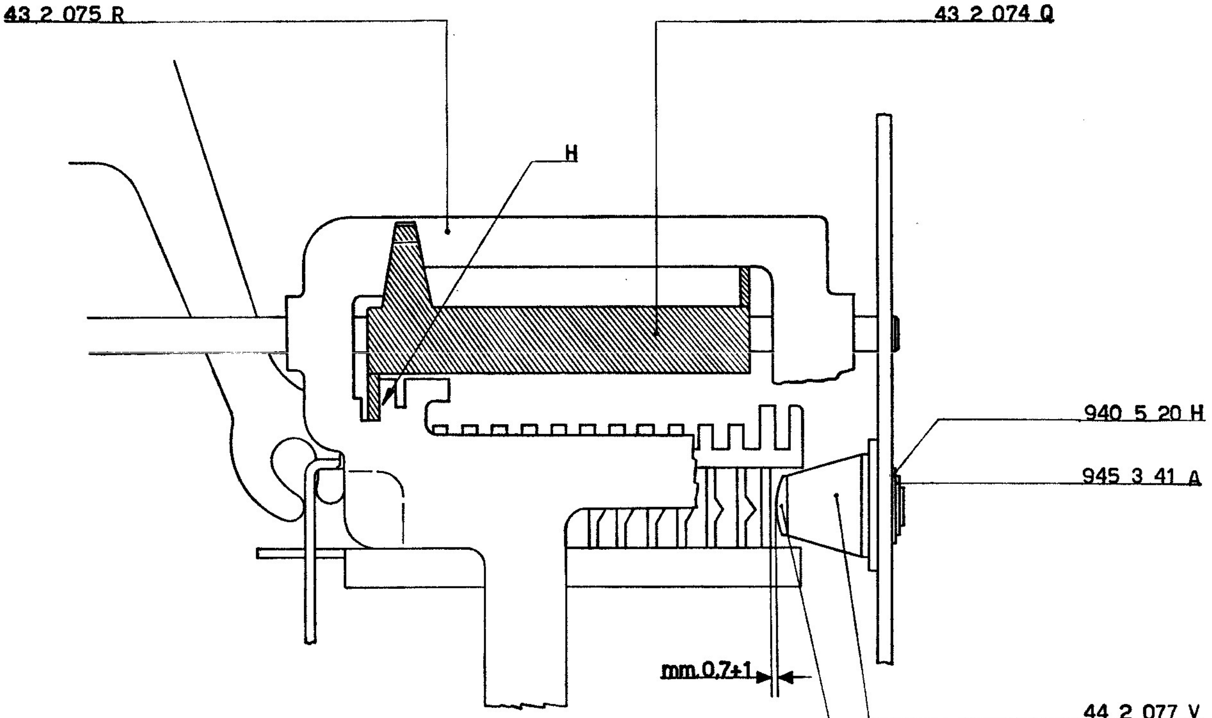
see Bulletin E-58 Dec. 64

b) Move the movable dog 43 2 074 Q *rightward so that it rests on the plane* **H** *of the small plate* 43 2 075 R.

In these conditions we should have the clearance of 0.7÷1 *mm. shown in the figure.*

Replace if necessary the washer 940 5 20 H *by the* 940 5 04 E.

44 2 077 V	Slide stop cam
43 2 074 Q	Slide stop dog
43 2 075 R	Slide guide and escapement plate
43 2 096 F	Slide stop rubber pad carrying pivot
940 5 04 E	Washer (if necessary)
940 5 20 H	Washer for 43 2 096 F
945 3 41 A	Spring clip for 43 2 096 F


43 2 075 R
43 2 074 Q
H
940 5 20 H
945 3 41 A
mm 0,7÷1
44 2 077 V
43 2 096 F

(100)

82 - FIGURES 101 and 102

Adjusting the position of the current-keyboard reciprocal locking lever.

a) Move the main cam to rest.

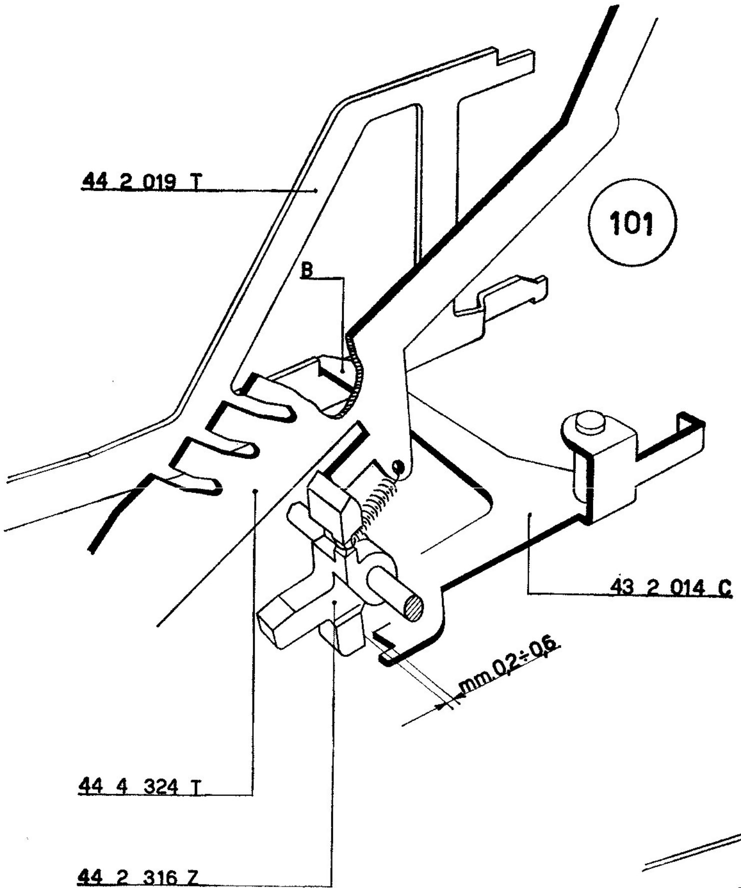
b) The extension **B** *of the current-keyboard reciprocal lockin lever* 43 2 014 C *should be in contact with the universal bar* 44 2 019 T.

c) By depressing the numeral keys of the keyboard, the universal bar 44 2 019 T *is pushed toward the rear of the machine. It rotates therefore the lever* 43 2 014 C. *Between this latter and the locking rocker* 44 2 316 Z *there should be the reading of* 0,2÷0,6 *mm. shown in the figure* 101. *Move if necessary along its slot the pivot supporting the lever* 43 2 014 C.

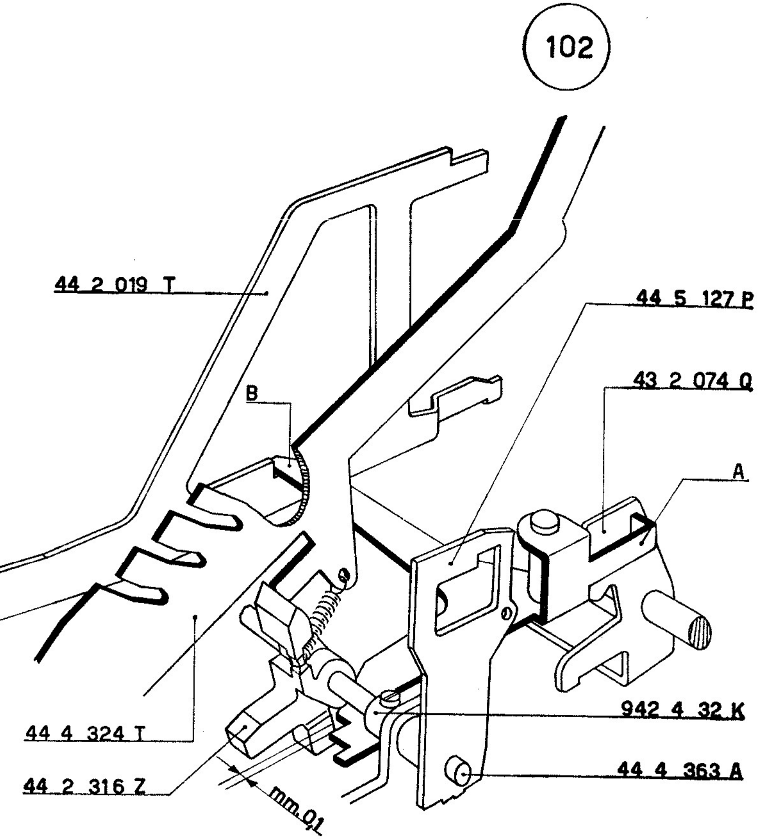
d) Start the machine by moving forward the slider 44 4 324 T. *This latter rotates the rocker* 44 2 316 Z *which, with respect to the lever* 43 2 014 C, *should pass with a clearance of* 4.1 *mm. (fig.* 102). *The condition is obtained by moving suitably the shaft* 44 4 363 A. *The axial play of this latter should be minimum and will be obtained by moving suitably the collar* 942 4 32 K *and the arm* 44 5 127 P..

e) Check that the extension **B** *of the lever* 43 2 014 C *is in contact with the universal bar* 44 2 019 T; *its arm* **A** *should on the contrary skim the slide stop dog* 43 2 074 Q. *Act if necessary on the arm* **A**.

44 2 019 T	Keyboard universal bar plate
44 2 316 Z	Current-keyboard reciprocal locking rocker
44 4 324 T	Clutch control right slider
44 4 363 A	Shaft
44 5 127 P	Servomechanism totals control arm
43 2 014 C	Current-keyboard reciprocal locking lever
43 2 074 Q	Slide stop dog
942 4 32 K	Collar


44 2 019 T
B
44 4 324 T
44 2 316 Z
43 2 014 C
mm.0,2÷0,6

101


44 2 019 T
B
44 5 127 P
43 2 074 Q
A
942 4 32 K
44 4 363 A
44 4 324 T
44 2 316 Z
mm.0,1

102

83 - FIGURE 103

Assembling the control plate stay.

On the appropriate pivot of the control plate 44 4 105 Z assemble the stay 44 4 407 Y securing it with a spring clip 945 2 21 S. Between the plate and the stay, hook the spring 68 0 422 X.

84 - FIGURE 104

Assembling the control plate stay control levers.

On the right external side-plate of the machine assemble, by means of the stud-screw 926 3 84 K and nut 938 3 51 D the two control plate stay control levers 44 4 099 W and 44 4 131 J. In the fork of the lever 44 4 099 W place the lower extension of the starting lever 44 4 019 V. The bent extension of the lever 44 4 131 J should be inserted in the appropriate opening made on the slider 44 4 012 N.

85 - FIGURES 104 and 105

Assembling and adjusting the servomechanism bridge restoring and control plate transmission cam.

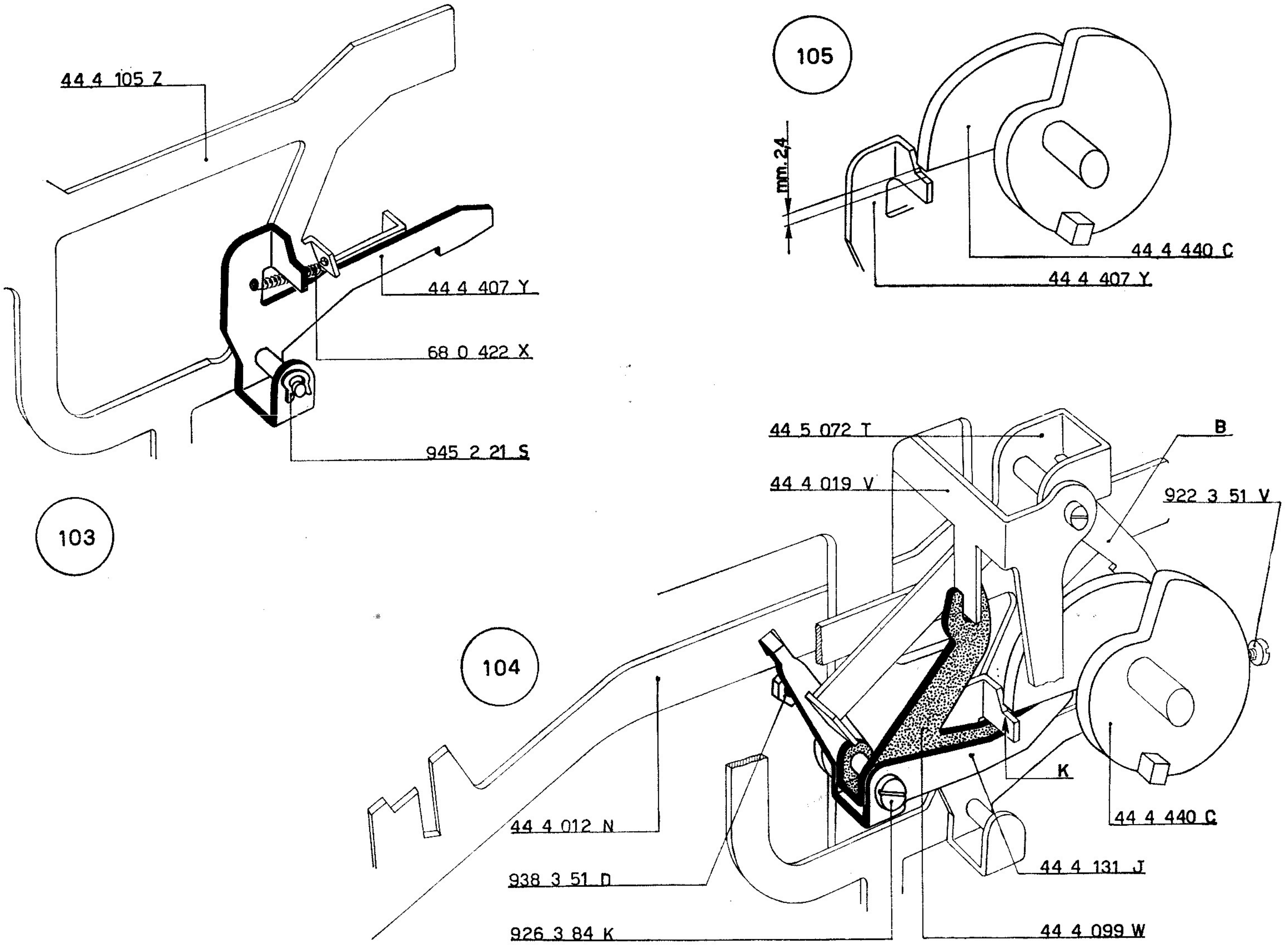
a) On the main shaft of the machine place the cam 44 4 440 C with the two screws 922 3 51 V.

b) Move the main shaft to rest.

c) Adjust the axial position of the cam by centering it with respect to the segment **K** *of the stay* **44 4 407 Y**. *Adjust its angular position to obtain the reading shown in the figure* 105. *Tighten the two screws of the cam.*

d) Check that the arm **B** *of the selector* **44 5 072 T** *is well engaged with the inside of the cam* **44 4 440 C** *(see also figure* 106). *Act if necessary on the arm* **B**.

44 4 012 N	Totals univresal bar slider
44 4 019 V	Starting lever
44 4 099 W	Current control plate stay control lever
44 4 105 Z	Control plate
44 4 131 J	Control plate stay control lever
44 4 407 Y	Control plate stay
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam
44 5 072 T	Second register subtraction control selector
68 0 422 X	Spring for 44 4 407 Y
922 3 51 V	Screw for cam 44 4 440 C
926 3 84 K	Stud-screw for 44 4 099 W and 44 4 131 J
938 3 51 D	Nut for 926 3 84 K
945 2 21 S	Spring clip for 44 4 407 Y


44 4 105 Z
44 4 407 Y
68 0 422 X
945 2 21 S
mm. 24
44 4 440 C
44 4 407 Y
44 5 072 T
B
44 4 019 V
922 3 51 V
44 4 012 N
K
44 4 440 C
938 3 51 D
44 4 131 J
926 3 84 K
44 4 099 W

103

104

105

86 - FIGURE 106

Assembling the printing control lever and the control plate dragging lever.

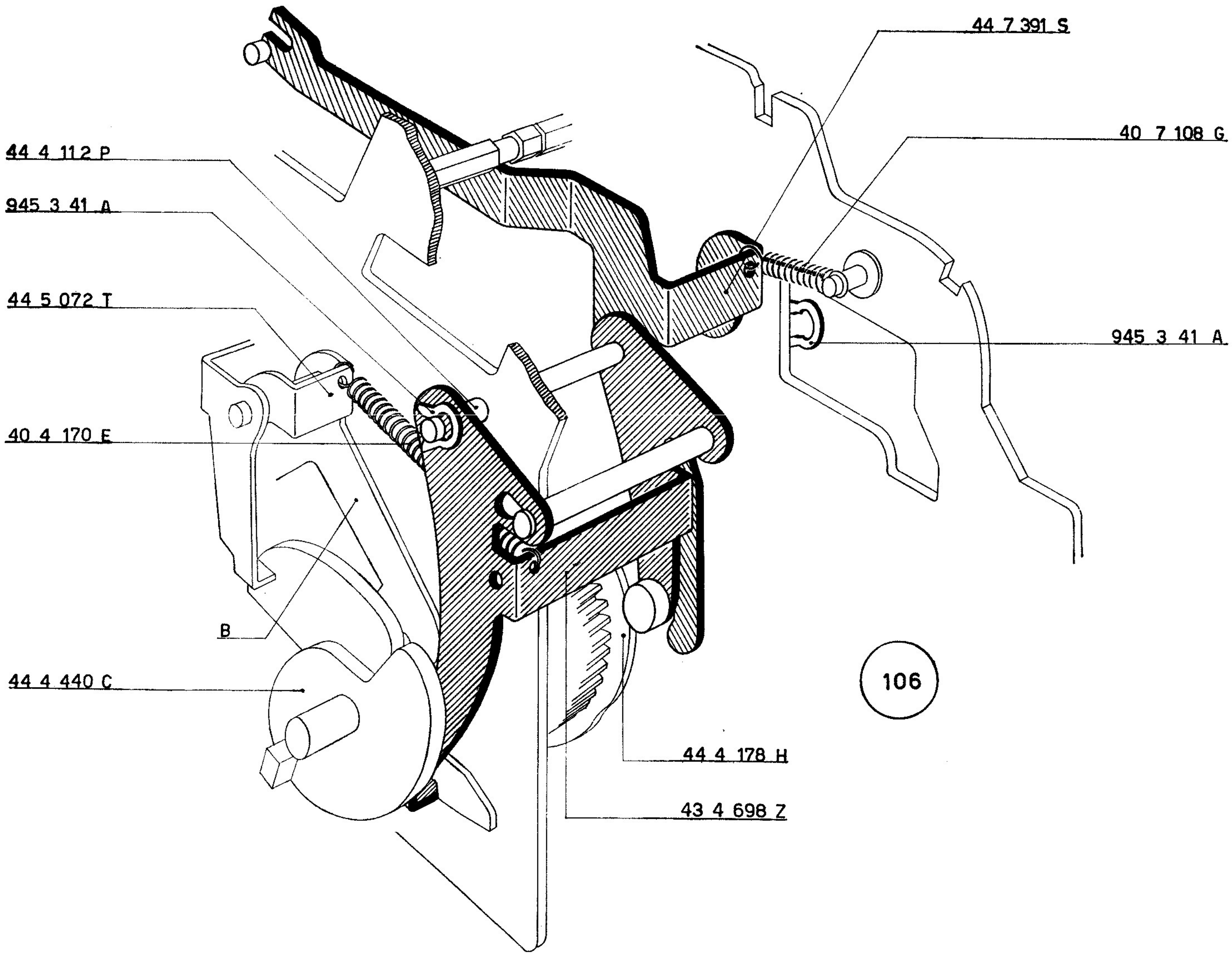
a) Between the two right side-plates of the machine place the printing control lever 44 7 391 S and the control plate dragging lever 43 4 698 Z. Pivot the two lever by means of the shaft 44 4 112 P which should be secured with two spring clips 945 3 41 A.

b) Hook the spring 40 4 170 E between the lever 43 4 698 Z and the selector 44 5 072 T.

c) Hook the spring 40 7 108 G between the lever 44 7 391 S and the spring carrier.

d) Rotate the main shaft and check that the cam 44 4 440 C *doesn't strike the lever* 43 4 698 Z. *Move if necessary the cam toward the outside of the machine. In this case check again the angular adjustment of the cam and the engagement of the arm* **B** *of the selector* 44 5 072 T *on the same cam.*

44 4 112 P	Shaft for the control plate dragging lever
44 4 178 H	Forward cam for 44 4 105 Z
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam
44 5 072 T	Second register subtraction control selector
44 7 391 S	Printing control lever
40 4 170 E	Spring for 44 5 072 T - 43 4 698 Z
40 7 108 G	Spring for 44 7 391 S
43 4 698 Z	Control plate dragging lever
945 3 41 A	Spring clip for 44 4 112 P


44 7 391 S
40 7 108 G
44 4 112 P
945 3 41 A
44 5 072 T
945 3 41 A
40 4 170 E
B
44 4 440 C
106
44 4 178 H
43 4 698 Z

87 - FIGURE 107

Adjusting the control restoring.

a) Assemble temporarily the total inversion control right arm 44 4 416 Q *os illustrated in the figure.*

b) Depress the total key and move rearward the control plate 44 4 105 Z.

c) Rotate the main shaft to move the cam 44 4 440 C *to the position of maximum restoring, illustrated in the figure. The stay* 44 4 407 Y *should be in contact with the extension* **A** *of the plate* 44 4 105 Z; *this latter should be at rest, that is in contact with the roller of the arm* 44 4 416 Q.

Act if necessary on the wing **B** *of the stay* 44 4 407 Y.

d) Move the main shaft back to rest.

44 4 012 N	Totals universal bar slider
44 4 019 V	Starting lever
44 4 099 W	Current control plate stay control lever
44 4 105 Z	Control plate
44 4 131 J	Control plate stay control lever

88 - FIGURE 108

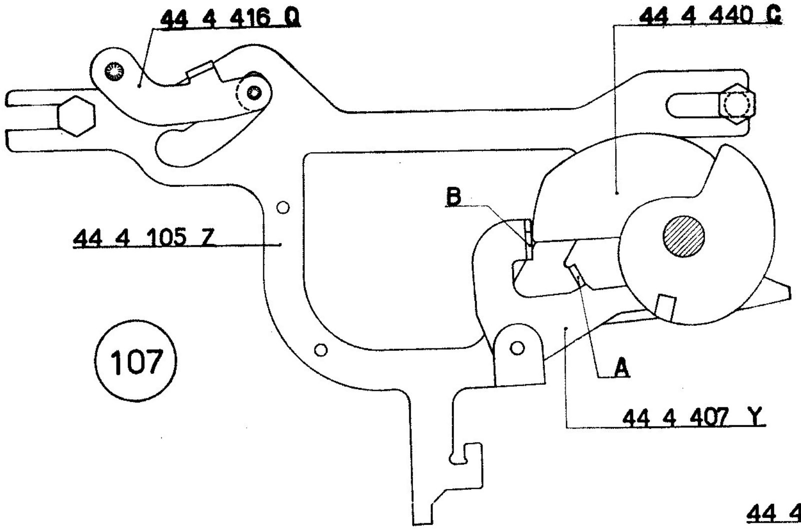
Adjusting the lever 44 4 099 W.

a) Move the slider 44 4 012 N *rearward to release the lever* 44 4 131 J *of the* 44 4 007 Y. *Check the reading of* 0.5÷1 *mm. shown in the figure. Act if necessary on the extension* **K** *of the starting lever* 44 4 019 V.

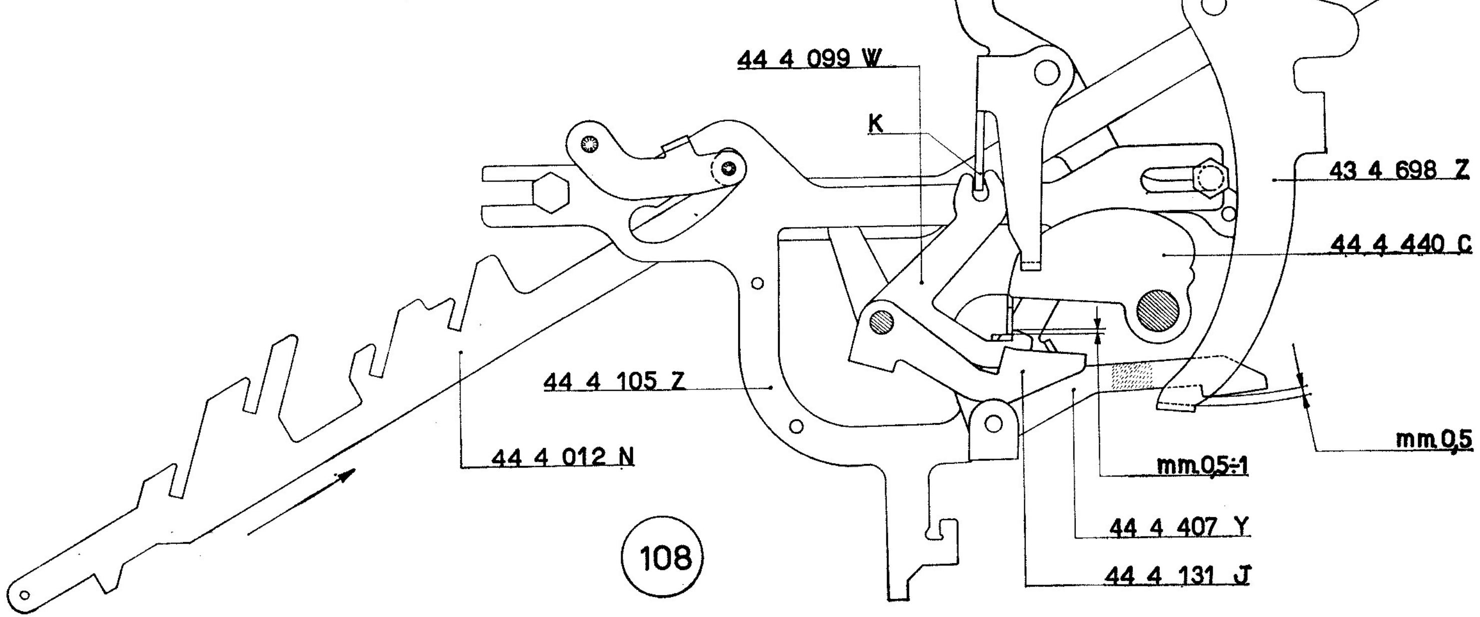
b) Check also that the plate 43 4 698 Z *passes with respect to the lever* 44 4 407 Y *with a clearance of* 0.5 *mm. Act if necessary on the same* 44 4 407 Y, *on the spot shown by hachures.*

N.B. — The external profile of the cam 44 4 440 C has not been illustrated in the figure 108.

44 4 407 Y	Control plate stay
44 4 416 Q	Total inversion control right arm shaft
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam
43 4 698 Z	Control plate dragging lever


44 4 416 Q
44 4 440 C
B
44 4 105 Z
A
44 4 407 Y

107


44 4 019 V
44 4 099 W
K
43 4 698 Z
44 4 440 C
44 4 105 Z
44 4 012 N
mm 0,5
mm 0,5÷1
44 4 407 Y
44 4 131 J

108

89 - FIGURE 109

Adjusting the control plate dragging lever.

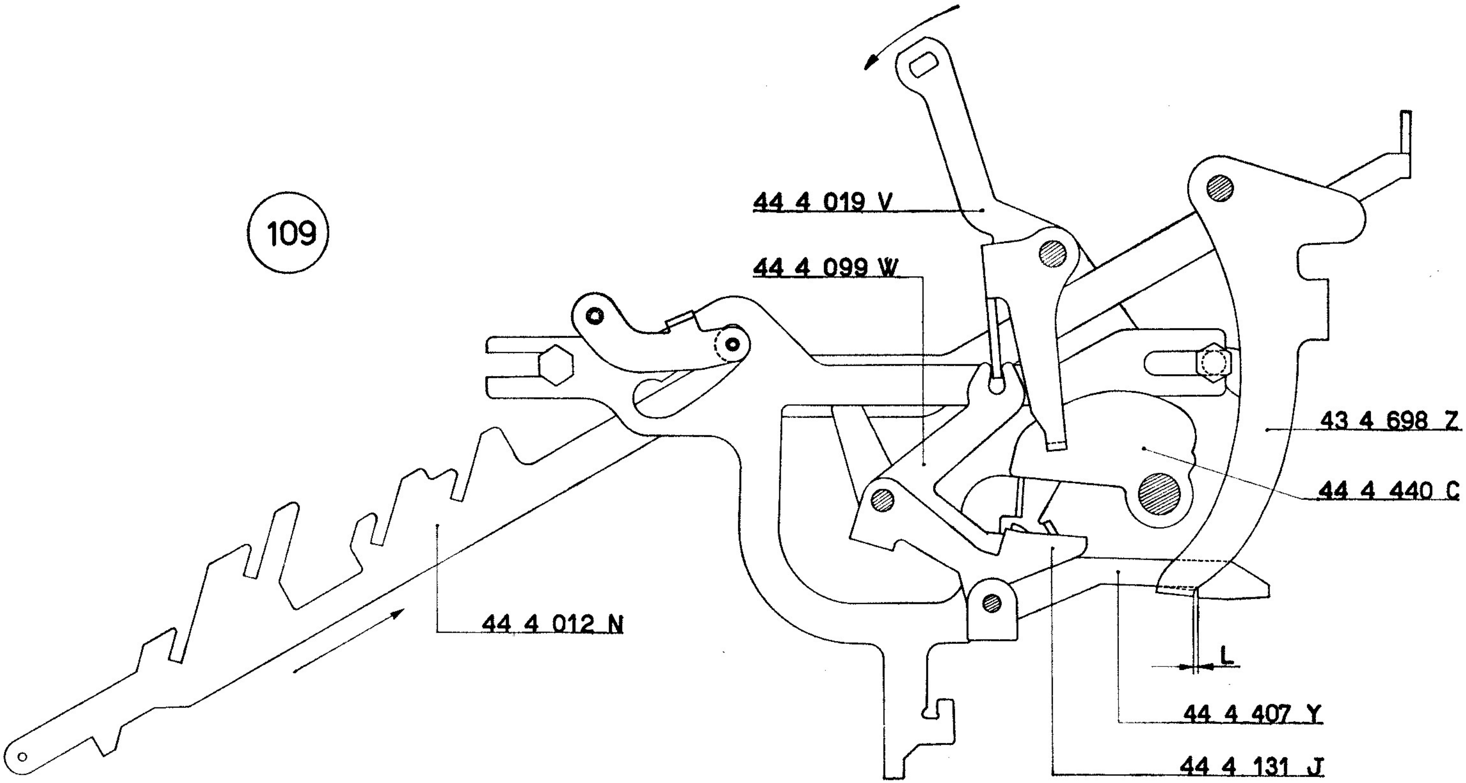
a) With the main shaft at rest rotate the cam which controls the control plate dragging lever 43 4 698 Z *so that this latter is completely displaced forward.*

b) Move the slider 44 4 012 N *toward the rear of the machine to release the lever* 44 4 131 J *from the* 44 4 407 Y. *Rotate in the direction shown by the arrow the starting lever* 44 4 019 V. *Check the clearance* **L** *shown in the figure. This clearance* **L** *should have a precise value which will be established in the following adjustment.*

c) Move the machine back to rest.

N.B. — The external profile of the cam 44 4 440 C has not been illustrated in the figure 109.

44 4 012 N	Totals universal bar slider
44 4 019 V	Starting lever
44 4 099 W	Current control plate stay control lever
44 4 131 J	Control plate stay control lever
44 4 407 Y	Control plate stay
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam
43 4 698 Z	Control plate dragging lever

109
44 4 019 V
44 4 099 W
43 4 698 Z
44 4 440 C
44 4 012 N
L
44 4 407 Y
44 4 131 J

90 - FIGURE 110

Adjusting the control plate travel.

a) Depress a total key.

b) Rotate the cam 44 4 178 H *in the direction shown by the arrow until it reaches the maximum control position illustrated in the figure. The control plate* 44 4 105 Z *should stop against the roller of the arm* 44 4 416 Q, *that is it should make its full travel. To check this it is sufficient to raise the stay* 44 4 407 Y *and check that it might re-engage with the lever* 43 4 698 Z *by forcing on it a little.*

This is obtained by varying the clearance **L** *shown in the figure* 109, *by acting suitably on the arms of the lever* 43 4 698 Z.

c) Move the machine back to rest.

91 - FIGURE 111

Adjusting the total clutch control hook.

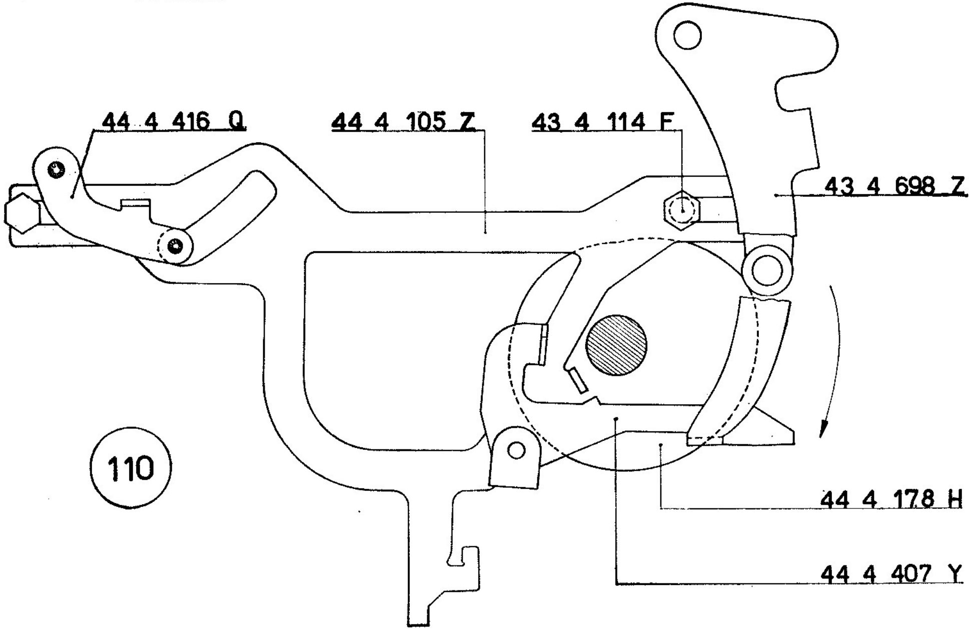
a) Depress a total key.

b) Move the plate 44 4 105 Z *completely toward the rear of the machine.*

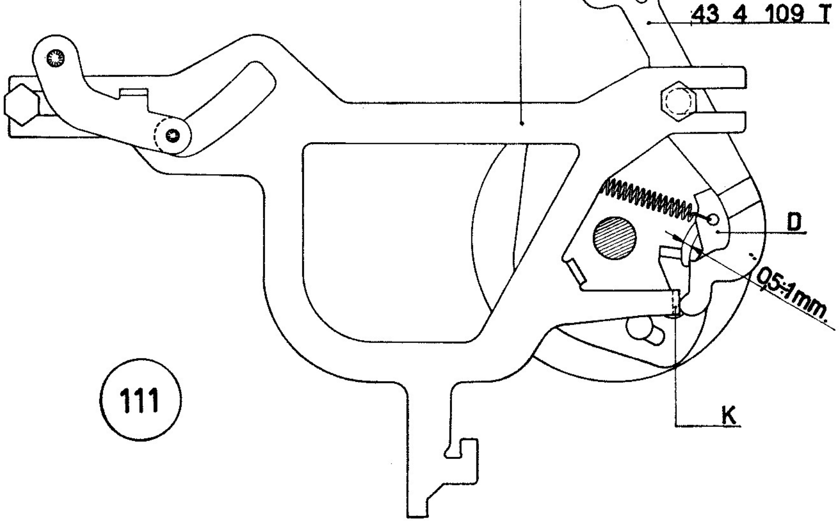
c) Check the reading of 0.5÷1 *mm. shown in the figure. Act if necessary on the bent* **K** *of the plate* 44 4 105 Z.

44 4 105 Z	Control bridge
44 4 178 H	Control plate forward cam
44 4 407 Y	Control plate stay
44 4 416 Q	Total inversion control right arm shaft

43 4 109 T	Total clutch control hook
43 4 114 F	Special guide nut for control plate
43 4 698 Z	Control plate dragging lever


44 4 416 Q
44 4 105 Z
43 4 114 F
43 4 698 Z
44 4 178 H
44 4 407 Y

110


44 4 105 Z
43 4 109 T
D
0,5-1mm
K

111

92 - FIGURES 112 and 113

a) On the shaft 44 5 132 L which can be guided by the small plate 44 4 043 V and by the support 44 5 165 V, assemble successively:

— the first register calculation slider stop bridge 44 4 101 V which bent wing should be placed behind the extension **A** of the slider 44 4 014 Q (figure 112). Place above it the pivot **P** of the stem 44 4 001 U. The bridge 44 4 101 V must be guided by the appropriate slot of the keyboard upper plate.

— The totals universal bar frame 44 6 347 C (figure 112). Connect the slider 44 4 012 N to the frame 44 6 347 C and secure it by means of a spring clip 945 2 21 S

— the second register calculation slider stop arm 44 4 102 W with the screw 922 3 02 V (see figure 112 and particularly the figure 113). The arm should be guided by the appropriate slot of the keyboard upper plate (figure 112) and, with respect to the slider 44 4 015 R, take the position illustrated in the figure 113. The screw must not be tightened

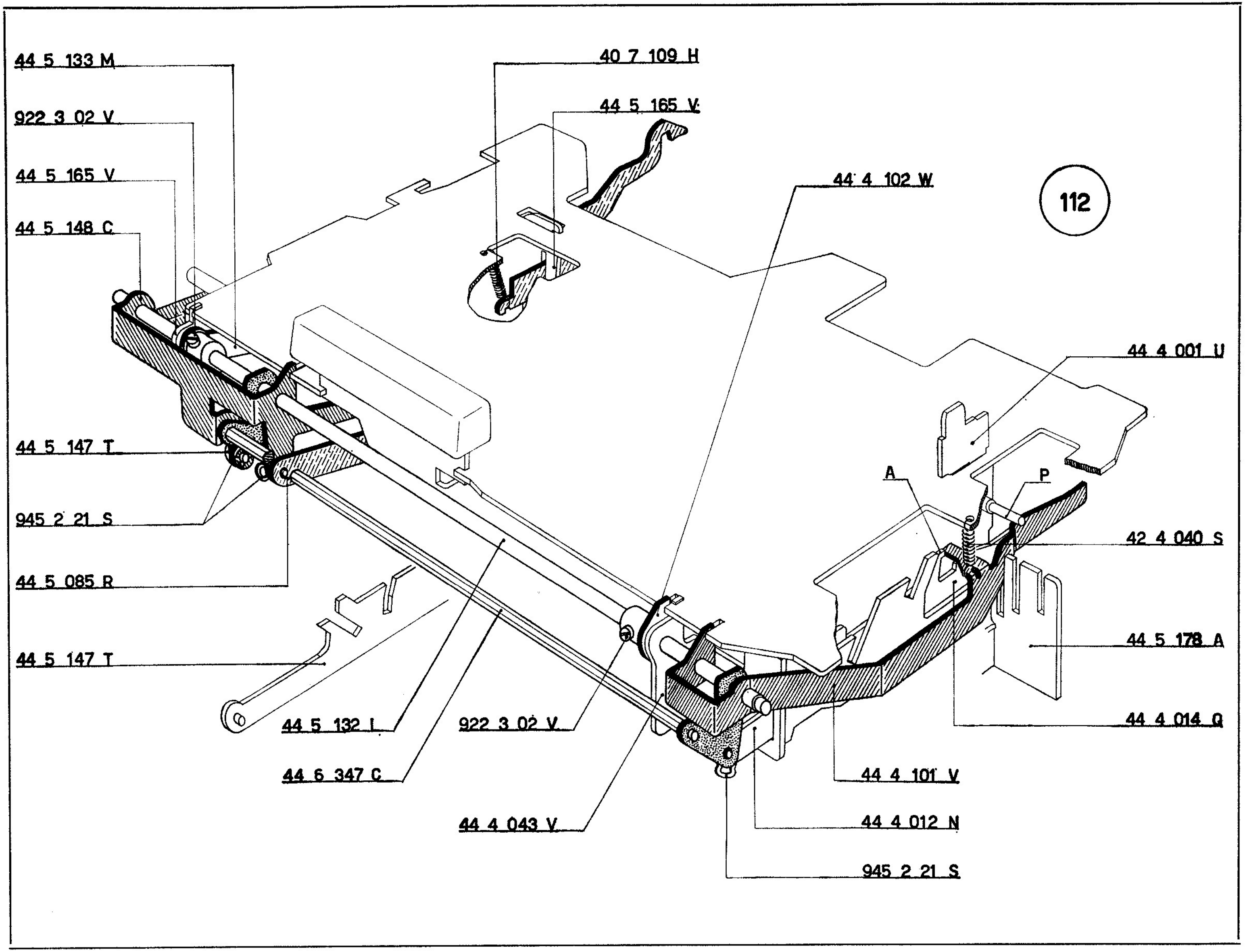
— the memory connecting-rod and the slider connection bridge 44 5 148 C which must be guided by the proper slot of the keyboard upper plate (figure 112)

— the servomechanism selector stay control left arm 44 5 133 M with the screw 922 3 02 V (figure 112). The arm must be guided by the proper slot made in the support 44 5 165 V (figure 113).

b) Assemble the multiplier slider control hook 44 5 085 R which should be guided by the support 44 5 165 V (figure 112). Connect it to the bridge 44 5 148 C and secure it by means of a spring clip 945 2 21 S.

c) Connect the slider 44 5 147 T (which has been also illustrated alone for better understanding) to the bridge 44 5 148 C; secure it with a spring clip 945 2 21 S (figure 112).

44 4 001 U	« Memory reading » and « totals » key-stem
44 4 012 N	Totals universal bar slider
44 4 014 Q	First register total and calculation slider
44 4 043 V	Sliders guide plate
44 4 101 V	First register calculation slider stop bridge
44 4 102 W	Second register calculation slider stop arm
44 5 085 R	Multiplier slider control hook
44 5 132 L	Shaft for rod control right arm
44 5 133 M	Servomechanism selector stay control left arm
44 5 147 T	Racks clearing and multiplier memory slider
44 5 148 C	Memory connecting-rod and slider connection bridge
44 5 165 V	Keys guide support
44 5 178 A	Right arms guide bracket
44 6 347 C	Totals universal bar frame shaft
40 7 109 H	Spring for 44 5 085 R
42 4 040 S	Spring for 44 4 101 V
922 3 02 V	Screws for 44 4 102 W and 44 5 133 M
945 2 21 S	Spring clip


112
44 5 133 M
922 3 02 V
44 5 165 V
44 5 148 C
44 5 147 T
945 2 21 S
44 5 085 R
44 5 147 T
40 7 109 H
44 5 165 V
44 4 102 W
44 4 001 U
A
P
42 4 040 S
44 5 178 A
44 4 014 Q
44 5 132 L
922 3 02 V
44 6 347 C
44 4 043 V
44 4 101 V
44 4 012 N
945 2 21 S

d) Assemble the totals universal bar left slider 44 6 045 Z which should be guided by the support 44 5 165 V (figure 113).

Here also we have repeated the illustration of the slider and of the support for better understanding.

Connect the slider to the frame 44 6 347 C and secure it with a spring clip 945 2 21 S.

e) Hook the spring 42 4 040 S between the bridge 44 4 101 V and the keyboard upper plate (figure 112).

f) Hook the spring 40 7 109 H between the hook 44 5 085 R and the keyboard upper plate (figure 112).

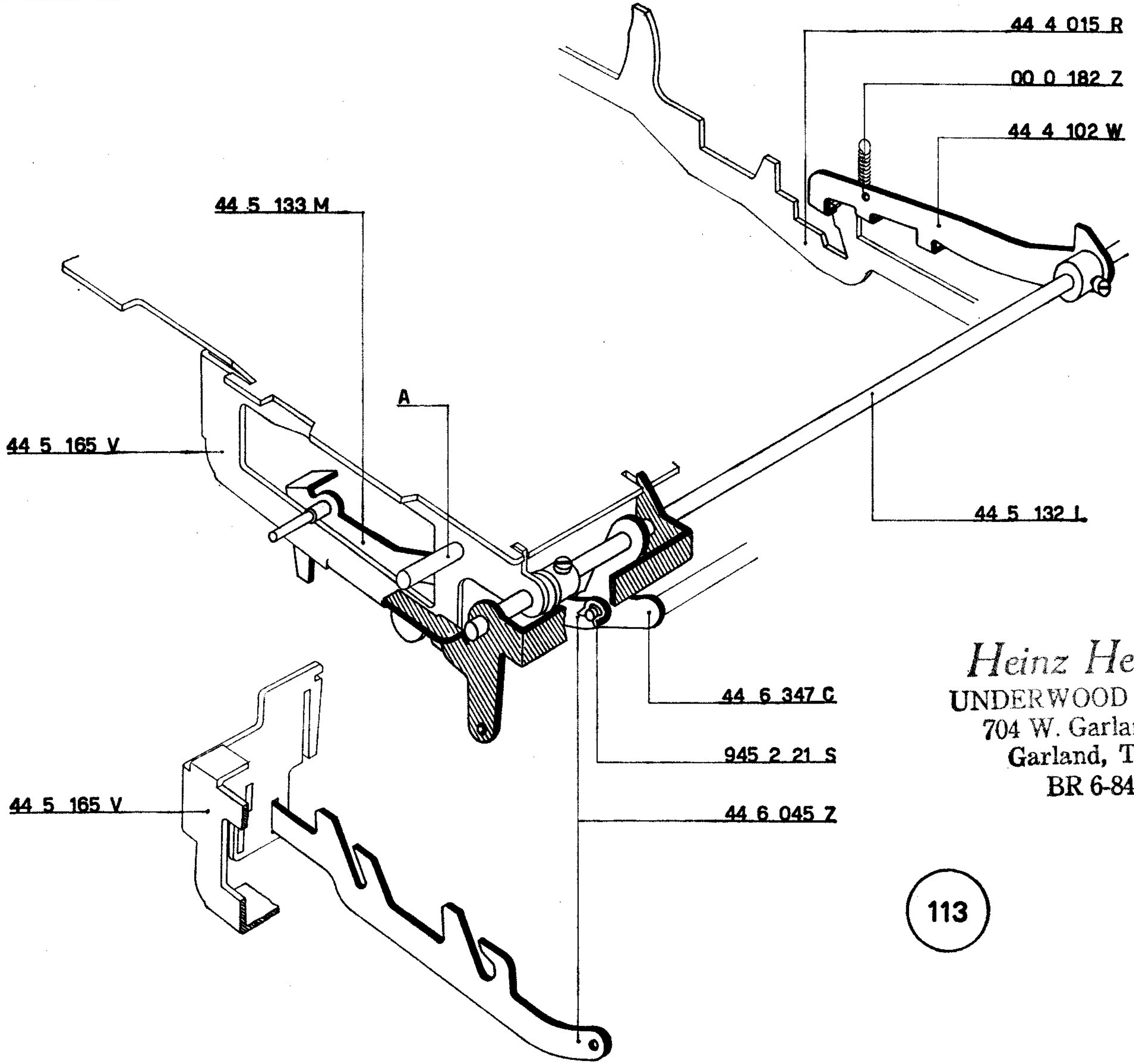
g) Move the shaft 44 5 132 L *to align it with the shaft* A *precedently assembled.*

Tighten but not right home the screw of the arm 44 4 102 W.

h) Move axially the arm 44 5 133 M *so that its hub is at* 0.2 *mm. from the support* 44 5 165 V.

Tighten the screw of the arm.

44 4 015 R	Second register total and calculation slider
44 4 102 W	Second register calculation slider stop arm
44 5 132 L	Shaft for the rod control right arm
44 5 133 M	Servomechanism selector stay control left arm
44 5 165 V	Keys-guide support
44 6 045 Z	Totals universal bar left slider
44 6 347 C	Totals universal bar frame shaft
00 0 182 Z	Spring for 44 4 102 W
945 2 21 S	Spring clip


44 4 015 R
00 0 182 Z
44 4 102 W
44 5 133 M
A
44 5 165 V
44 5 132 L
44 6 347 C
945 2 21 S
44 6 045 Z
44 5 165 V
113

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Garland, Texas
BR 6-8411

93 - FIGURE 114

Adjusting the second register calculation slider stop arm.

a) Move the main shaft to rest.

b) Rotate the arm 44 5 133 M *to move it to contact with the pivot* **P** *of the « division » key-stem* 44 4 002 V. *Tighten the screw of the arm.*

c) Adjust the angular position of the arm 44 4 102 W *so that its rear extension is in the middle of the inclined plane* **a-a** *of the slider* 44 4 015 R.

Tighten the screw of the arm.

d) Check also the reading of 0.8 *mm.; act if necessary on the arm* 44 4 102 W.

44 1 301 A	Base
44 4 002 V	« Division control » key-stem
44 4 015 R	Second register total and calculation slider
44 4 102 W	Second register calculation slider stop arm
44 5 132 L	Shaft for rod control right arm
44 5 133 M	Servomechanism selector stay control left arm

94 - FIGURE 115

Assembling the comb 44 5 180 Z and of the current left crank.

a) On the shaft 44 5 132 L place the current left crank 44 5 136 Q with the screw 922 3 02 V.

b) Assemble the comb 44 5 180 Z. In its central slot insert the crank 44 5 136 Q. Secure the comb to the keyboard upper plate and to the base of the machine by means of a screw 920 2 12 U and a screw 920 3 52 G.

95 - FIGURE 116

Adjusting axially and angularly the crank 44 5 136 Q.

a) Move the main shaft to rest.

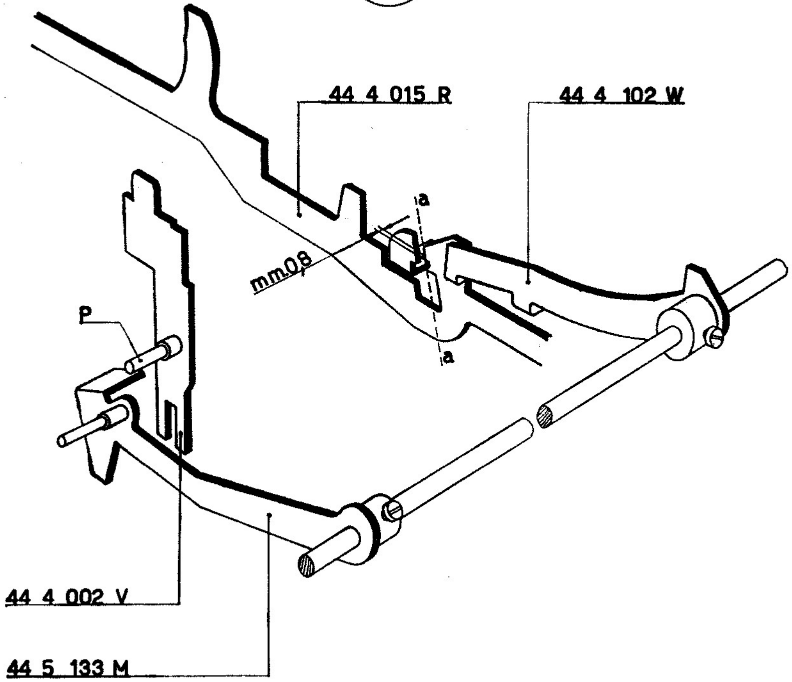
b) Depress an « add » key and rotate the main shaft by 90° *about.*

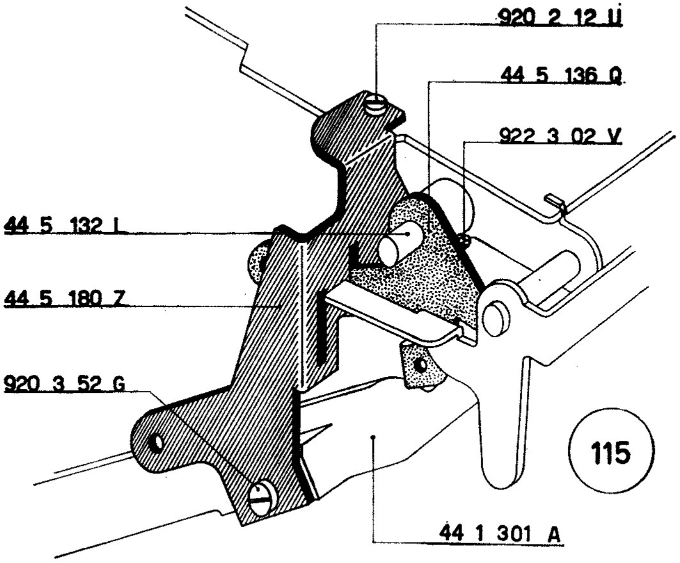
c) Adjust the angular position of the crank 44 5 136 Q *to obtain the reading shown in the figure. The crank should be centered with respect to the guide slot of the comb* 44 5 180 Z.

Tighten the screw of the crank.

44 5 136 Q	Current left crank
44 5 180 Z	Guide left comb
920 2 12 U	Securing screw for 44 5 180 Z
920 3 52 G	Securing screw for 44 5 180 Z
922 3 03 V	Screw for 44 5 136 Q

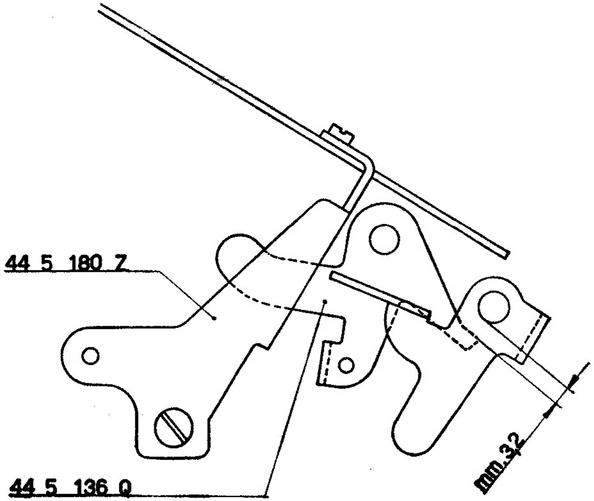
114


44 4 015 R
44 4 102 W
a
a
mm.0,8
P
44 4 002 V
44 5 133 M


920 2 12 U
44 5 136 Q
922 3 02 V
44 5 132 L
44 5 180 Z
920 3 52 G
44 1 301 A

115

116


44 5 180 Z
44 5 136 Q
mm.3,2

96 - FIGURES 117 and 118

Assembling the repeat slider transmission bridge.

Between the pivot 44 5 100 H and the pivot **P** of the support 44 4 021 P place the repeat slider transmission bridge 52 2 027 B. Its lower extension **K** should be placed, with respect to the pivot **P** of the bridge 44 2 082 K, as illustrated in the figure 118. Secure the bridge by means of a spring clip 945 2 21 S and by interposing the washer 940 3 66 J.

97 - FIGURE 117

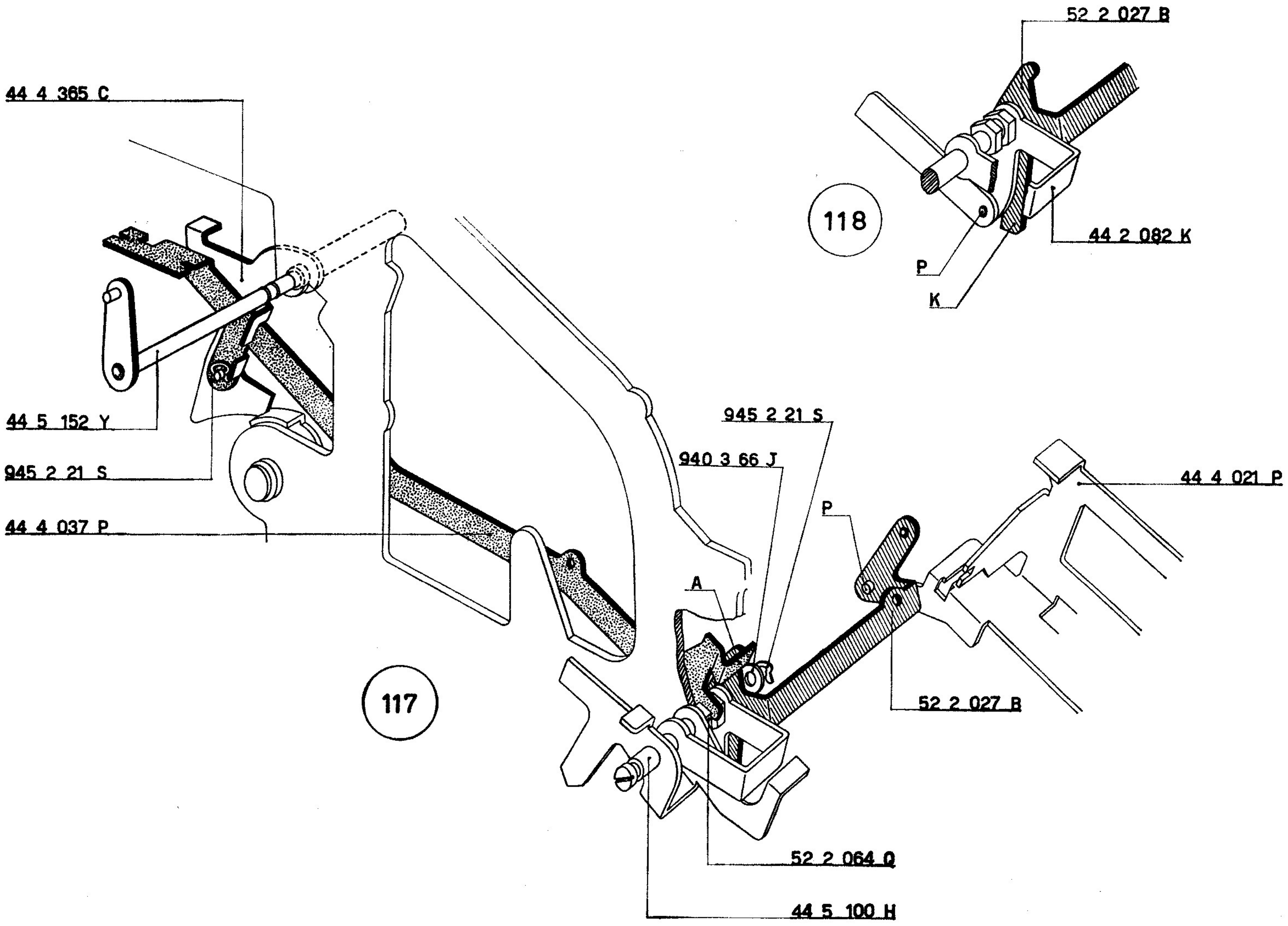
Assembling the printing and repeat sliders restoring plate 44 4 037 P and the cam-arm 44 4 365 C.

a) In the appropriate guide of the arm 44 4 365 C place the printing and repeat sliders restoring plate 44 4 037 P. Secure the plate by means of a spring clip 945 2 21 S.

b) Assemble this unit now prepared in the inside of the left external side-plate of the machine. The front extension of the plate 44 4 037 P should be placed in the guide of the pivot 52 2 064 Q; the extension **A** should be placed in front of the bridge 52 2 027 B.

c) Secure temporarily the arm 44 4 365 C by means of the shaft of the engagement control arm 44 5 152 Y.

44 2 082 K	Repeat control bridge
44 4 021 P	Keys-guide left support
44 4 037 P	Printing and repeat sliders restoring plate
44 4 365 C	Cam-arm for printing and repeat slider restoring plate
44 5 100 H	Special pivot
44 5 152 Y	Engagement control arm
52 2 027 B	Repeat slider transmission bridge
52 2 064 Q	Special pivot
940 3 66 J	Washer
945 2 21 S	Spring clip


52 2 027 B
118
P
K
44 2 082 K
44 4 365 C
44 5 152 Y
945 2 21 S
44 4 037 P
945 2 21 S
940 3 66 J
44 4 021 P
P
A
52 2 027 B
117
52 2 064 Q
44 5 100 H

98 - FIGURE 119

Assembling the printing slider.

a) Hook the spring 68 0 415 Y to the printing slider 44 4 016.J

b) Assemble the printing slider 44 4 016 J which should be guided by the appropriate slots of the support 44 4 037 P. The extension **A** of the slider should take, with respect to the plate 44 4 037 P and to the lever 43 4 014 E, the position illustrated in the figure.

99 - FIGURE 120

Assembling the repeat slider.

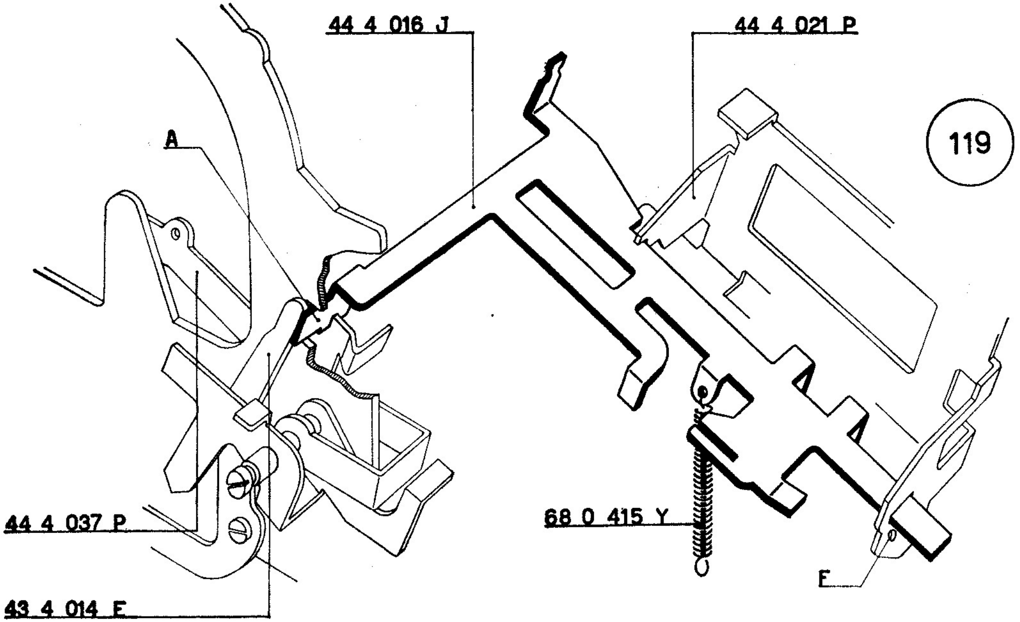
a) Hook the repeat slider 43 4 013 D to the spring 40 2 114 Q.

b) In the appropriate guide slot of the support 44 4 021 P insert the slider 43 4 013 D which should be connected to the bridge 52 2 027 B and secured with a spring clip 945 2 21 S.

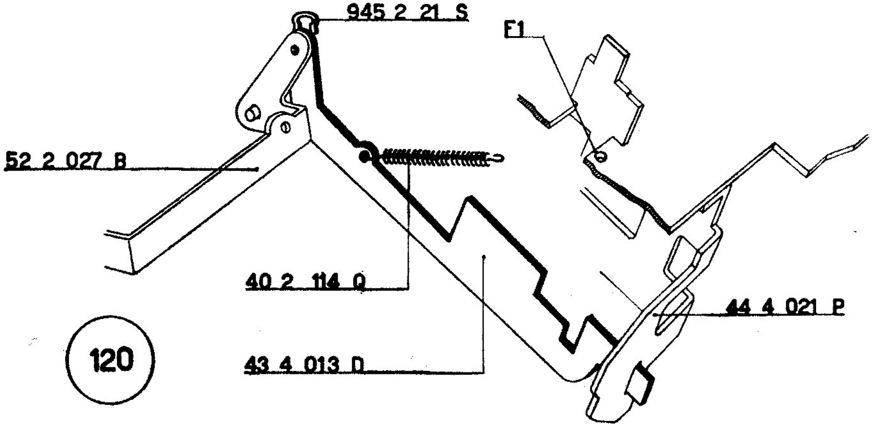
c) Hook the spring 40 2 114 Q to the hole **F1** of the keyboard upper plate.

d) Hook the spring 68 0 415 Y from the slider 44 4 016 J to the hole **F** of the support 44 4 021 P (figure 119).

44 4 016 J	Printing slider
44 4 021 P	Keys-guide left support
44 4 037 P	Printing and repeat sliders restoring plate
40 2 114 Q	Spring for 43 4 013 D
43 4 013 D	Repeat slider
43 4 014 E	Back-space tooth control lever
52 2 027 B	Repeat slider transmission bridge
68 0 415 Y	Spring for 44 4 016 J
945 2 21 S	Spring clip


44 4 016 J
44 4 021 P
A
44 4 037 P
43 4 014 E
68 0 415 Y
F

119


945 2 21 S
F1
52 2 027 B
40 2 114 Q
44 4 021 P
43 4 013 D

120

100 - FIGURE 121

Assembling the printing control plate transmission lever.

a) On the column 43 7 032 B place, correctly orientated, the printing control plate transmission lever 44 4 038 Y.

b) Assemble this unit on the keyboard upper plate. In the appropriate slot of the lever insert the extension **A** of the slider 44 4 016 J.

Secure the column by means of the nut 938 3 05 G.

c) Secure the lever 44 4 038 Y by means of the spring clip 945 2 51 G.

44 4 016 J	Printing slider
44 4 038 Y	Printing control plate transmission lever
44 7 007 V	Date key hooking slider
44 7 008 E	Date lever

101 - FIGURE 122

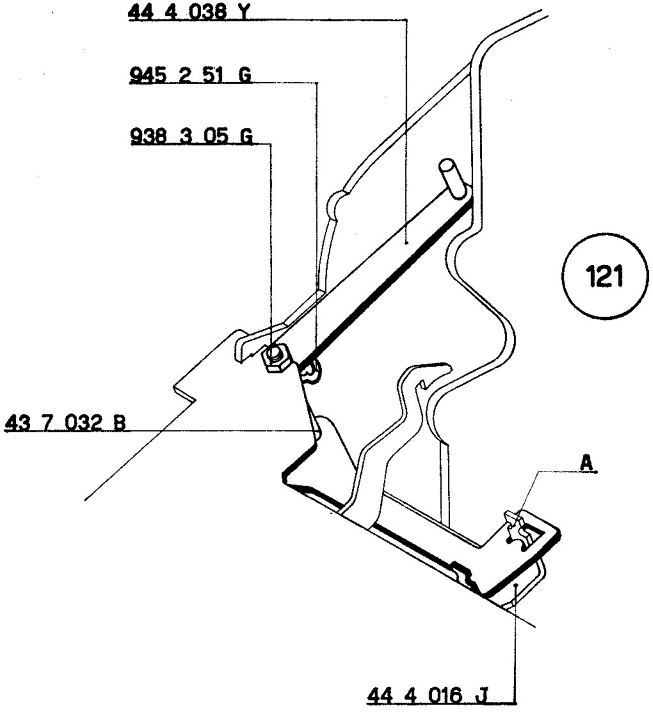
Preparing the date key.

a) Place the extensions **A** and **B** of the slider 44 7 007 V in the appropriate guide slots of the date key 44 7 008 E. By means of a pliers bent the extension **B** thus stopping the slider.

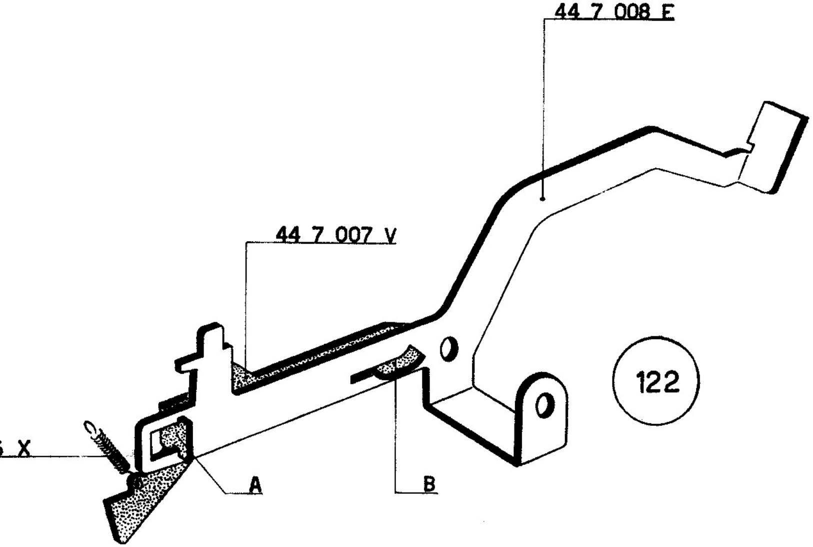
Check that the slider moves perfectly.

b) Hook the spring 40 4 076 X to the date key 44 7 0008 E.

40 4 076 X	Spring for 44 7 007 V
43 7 032 B	Column for 44 4 038 Y
938 3 05 G	Nut for 43 7 032 B
945 2 51 G	Spring clip for 44 4 038 Y


44 4 038 Y
945 2 51 G
938 3 05 G
43 7 032 B
A
44 4 016 J

121


44 7 008 E
44 7 007 V
40 4 076 X
A
B

122

102 - FIGURES 123 - 124 - 125

Assembling the date key.

a Disassemble the side-plates connection shaft 44 1 008 G and the columns 43 1 016 D (figure 7).

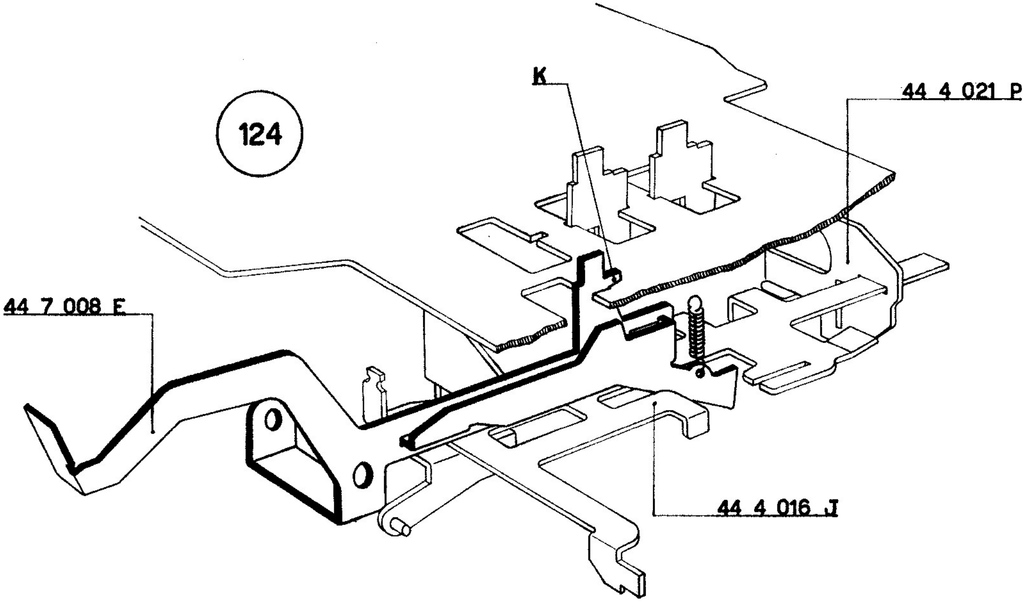
b) By means of pliers bent the extension **K** of the date lever 44 7 008 E (90° about), in the direction illustrated in the figure 123. In this way it will be easier to assemble the lever.

c) Assemble the date key prepared in the precedent paragraph. It should take, with respect to the slider 44 4 016 J, the position illustrated in the figure 124. Its extension **K** must be inserted in the appropriate guide slot made in the keyboard upper plate.

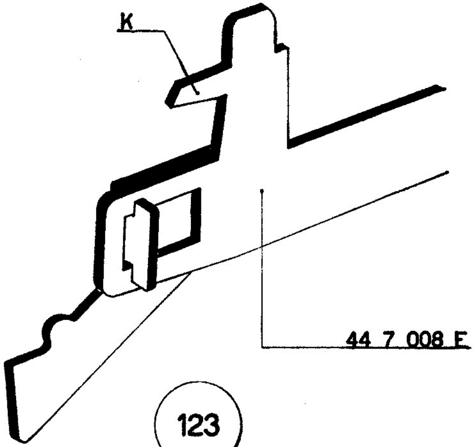
The position the lever 44 7 008 E should take is illustrated in the figure 125.

d) By means of pliers straighten the extension **K** of the lever 44 7 008 E.

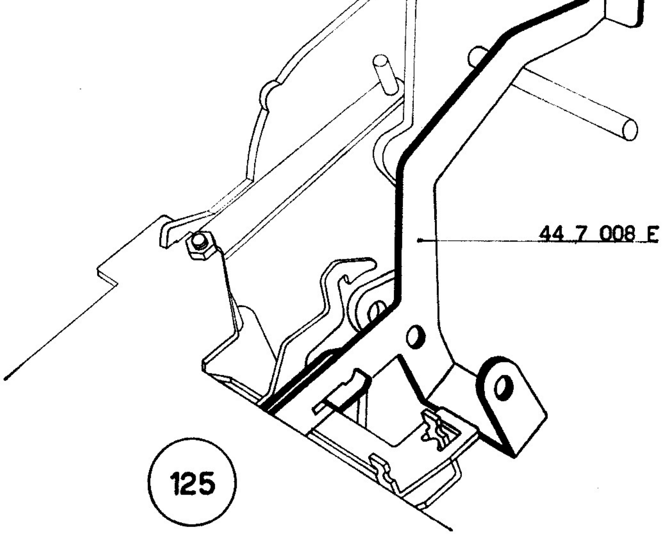
44 4 016 J	Printing slider
44 4 021 P	Keys-guide left support
44 7 008 E	Date lever


K
44 4 021 P
44 7 008 F
44 4 016 J

124



123



125

103 - FIGURES 126 and 127

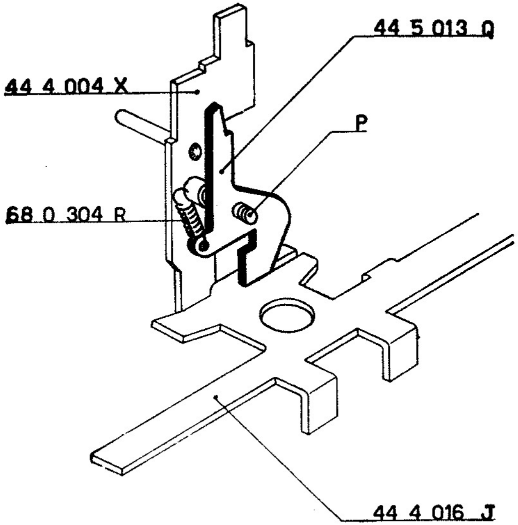
Assembling the hook of the multiplier key.

a) Unhook the spring 42 2 042 N placed between the « memory input » key-stem 44 4 004 X and the keyboard upper plate (figure 51).

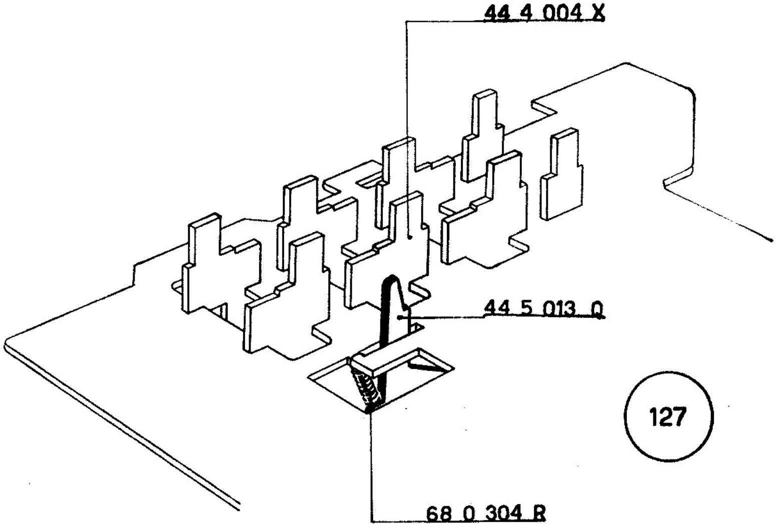
b) On the pivot **P** of the stem, assemble, correctly orientated, the hook 44 5 013 Q which should be guided by the keyboard upper plate (figure 127) and by the appropriate slot of the printing slider 44 4 016 J (figure 126).

c) Hook the spring 68 0 304 R between the hook 44 5 013 Q and the keyboard upper plate.

44 4 004 X	« Memory input » key-stem
44 4 016 J	Printing slider
44 5 013 Q	« Memory input » key-stem
68 0 304 R	Spring for 44 5 013 Q


44 5 013 Q
44 4 004 X
P
68 0 304 R
44 4 016 J

126


44 4 004 X
44 5 013 Q
68 0 304 R

127

104 - FIGURE 128

Assembling the division connecting-rod release bridge.

Place in the inside of the left external side-plate of the machine, the division connecting-rod release bridge 44 6 026 N. Its front extension must be inserted in the appropriate guide slot of the support 44 5 165 V and placed under the pivot **P** of the « division control » key. Furthermore, the wing **A** of the same connecting-rod should take, with respect to the bridge 44 2 082 K, the position illustrated in the figure.

44 2 082 K	Repeat control bridge
44 5 136 Q	Current left crank
44 5 165 V	Keys-guide support
44 6 005 S	Current control intercepted arm
44 6 006 T	Current control arm

105 - FIGURE 129

Assembling the division connecting-rod stop crank, the current control arm and the current control intercepted arm.

a) On the bridge 44 6 026 N place the division connecting-rod stop crank 44 6 007 U with the screws 922 3 01 U.

b) Pivot the bridge 44 6 026 N and the crank 44 6 007 U by means of the shaft of the current control arm 44 6 006 T. The shaft should afterward project from the proper guide hole of the left internal side-plate.

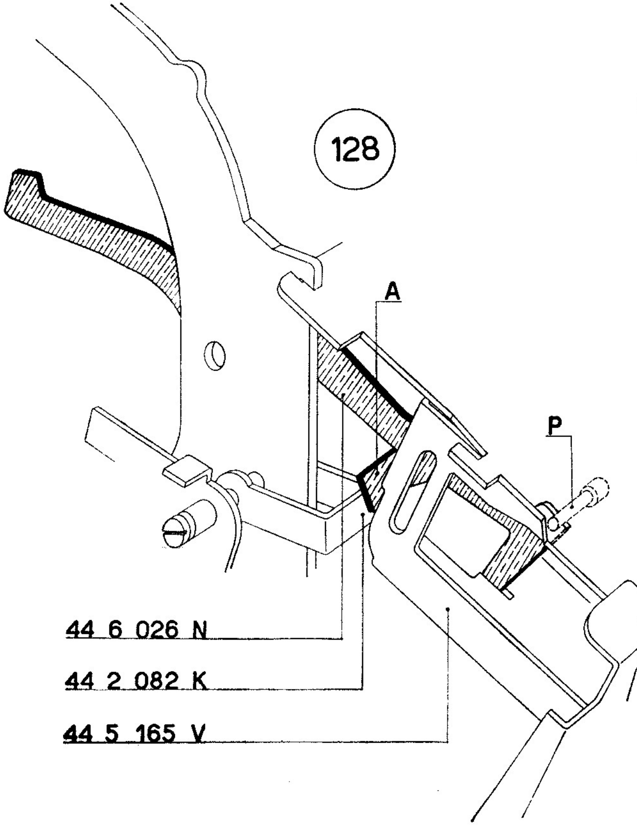
c) On the shaft of the arm 44 6 006 T place the arm 44 6 005 S with the two screws 922 3 02 V. At the bottom, the above arm must be guide by the left internal side-plate (see figure 130).

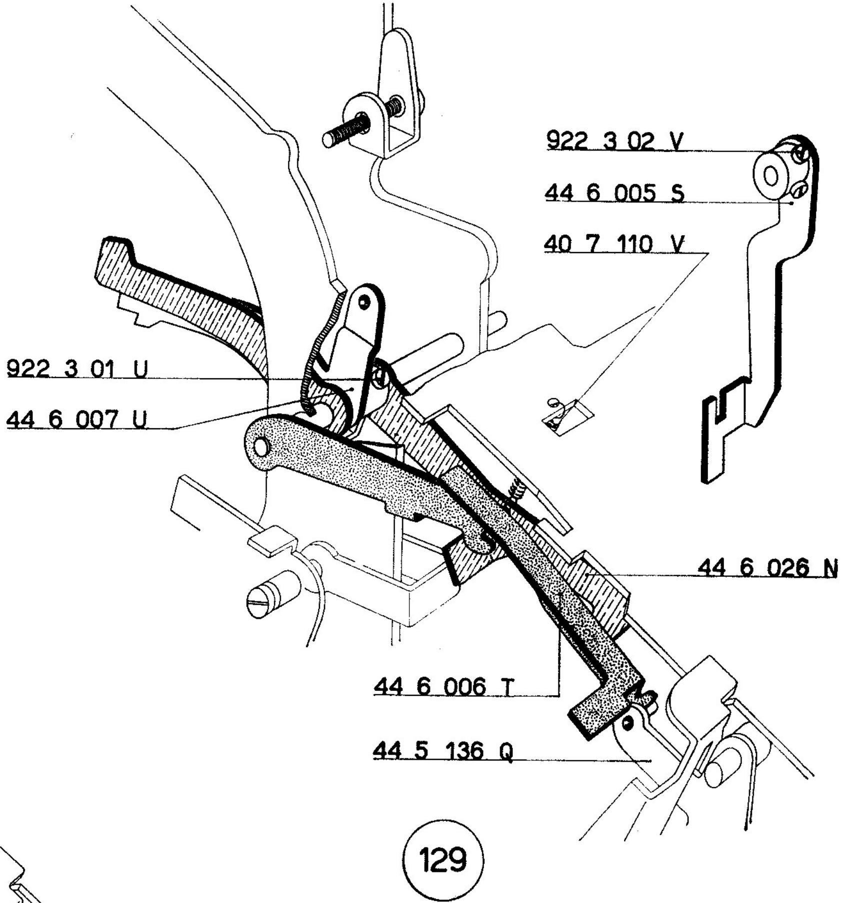
d) Adjust the axial position of the arm 44 6 005 S *to leave a little play to the arm* 44 6 006 T.

Tighten but not right home the screws of the arm 44 6 005 S.

e) Between the bridge 44 6 026 N and the keyboard upper plate hook the spring 40 7 110 V.

44 6 007 U	Division connecting-rod stop crank (current control)
44 6 026 N	Division connecting-rod release bridge
40 7 110 V	Spring for 44 6 026 N
922 3 01 U	Screw for 44 6 007 U
922 3 02 V	Screw for 44 6 005 S


128
A
P
44 6 026 N
44 2 082 K
44 5 165 V


922 3 02 V
44 6 005 S
40 7 110 V
922 3 01 U
44 6 007 U
44 6 026 N
44 6 006 T
44 5 136 Q
129

106 - FIGURE 130

Assembling the current release bridge.

a) In the appropriate seats of the left internal side-plate of the machine place the current release bridge 44 6 004 Z. *Reduce the axial play to a minimum.*

b) Between the bridge and the side-plate hook the spring 40 4 052 X.

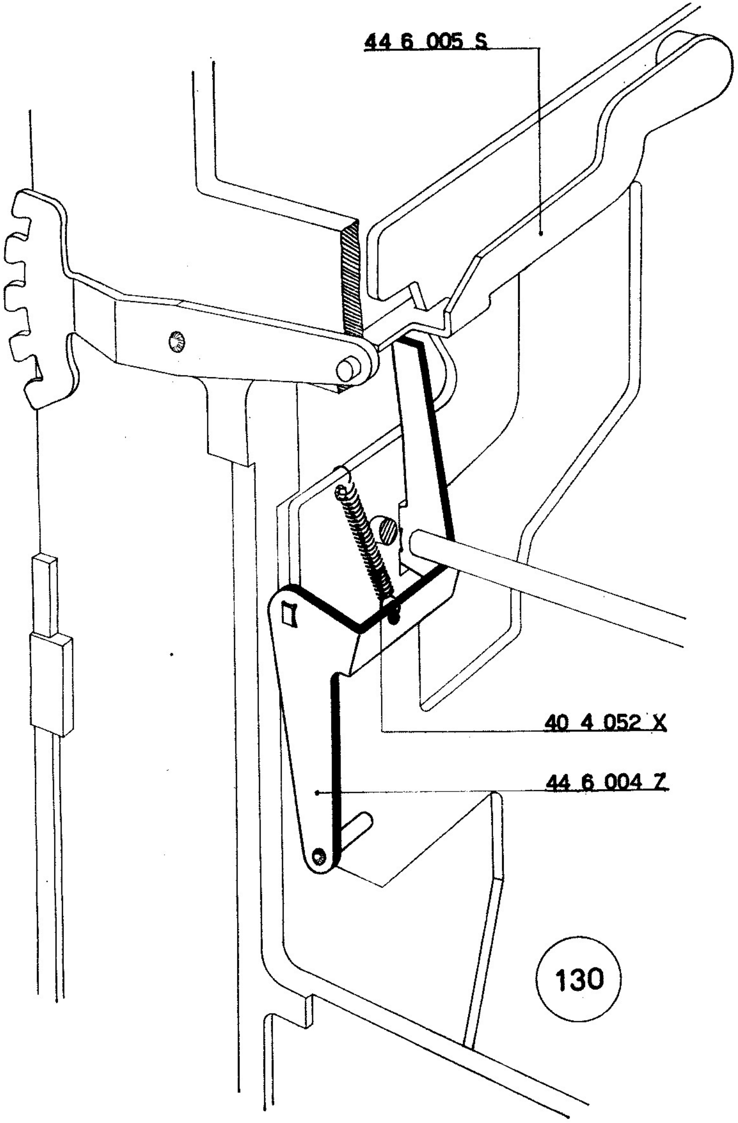
44 6 004 Z	Current release bridge
44 6 005 S	Current control intercepted arm
44 6 029 Z	Division connecting-rod exceeding bridge

107 - FIGURE 131

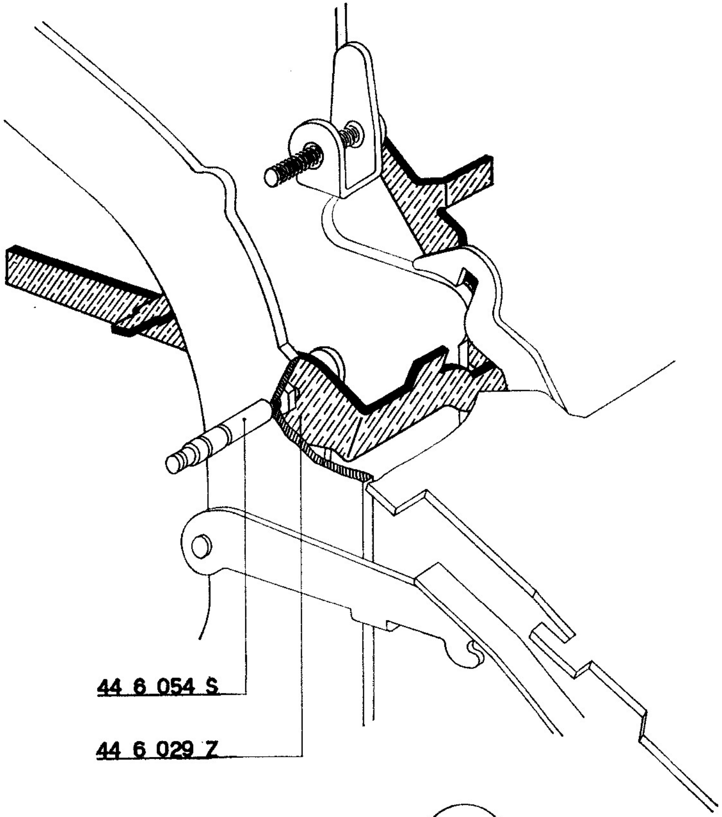
Assembling the division connecting-rod control exceeding bridge.

Plate the bridge 44 6 029 Z on the pivot 44 6 054 S.

44 6 054 S	Memory engagement connecting-rod guide pivot
40 4 052 X	Spring for 44 6 004 Z


44 6 005 S
40 4 052 X
44 6 004 Z

130


44 6 054 S
44 6 029 Z

131

108 - FIGURE 132

Assembling the hook-bridge.

a) Between the two internal side-plates of the machine, place the shaft 44 6 062 S on which you will place the hook-bridge 44 6 060 C. This latter must be guided by the left internal side-plate.

b) Secure the shaft by means of two spring-clips 945 3 41 A.

c) Between the hole **F** of the bridge 44 6 060 C and the hole **F1** of the left internal side-plate, hook the spring 40 4 076 C.

109 - FIGURE 132

Assembling the division connecting-rod partial restoring and printing control hook; the engagement anchor control bridge.

a) Remove the engagement control arm 44 5 152 Y.

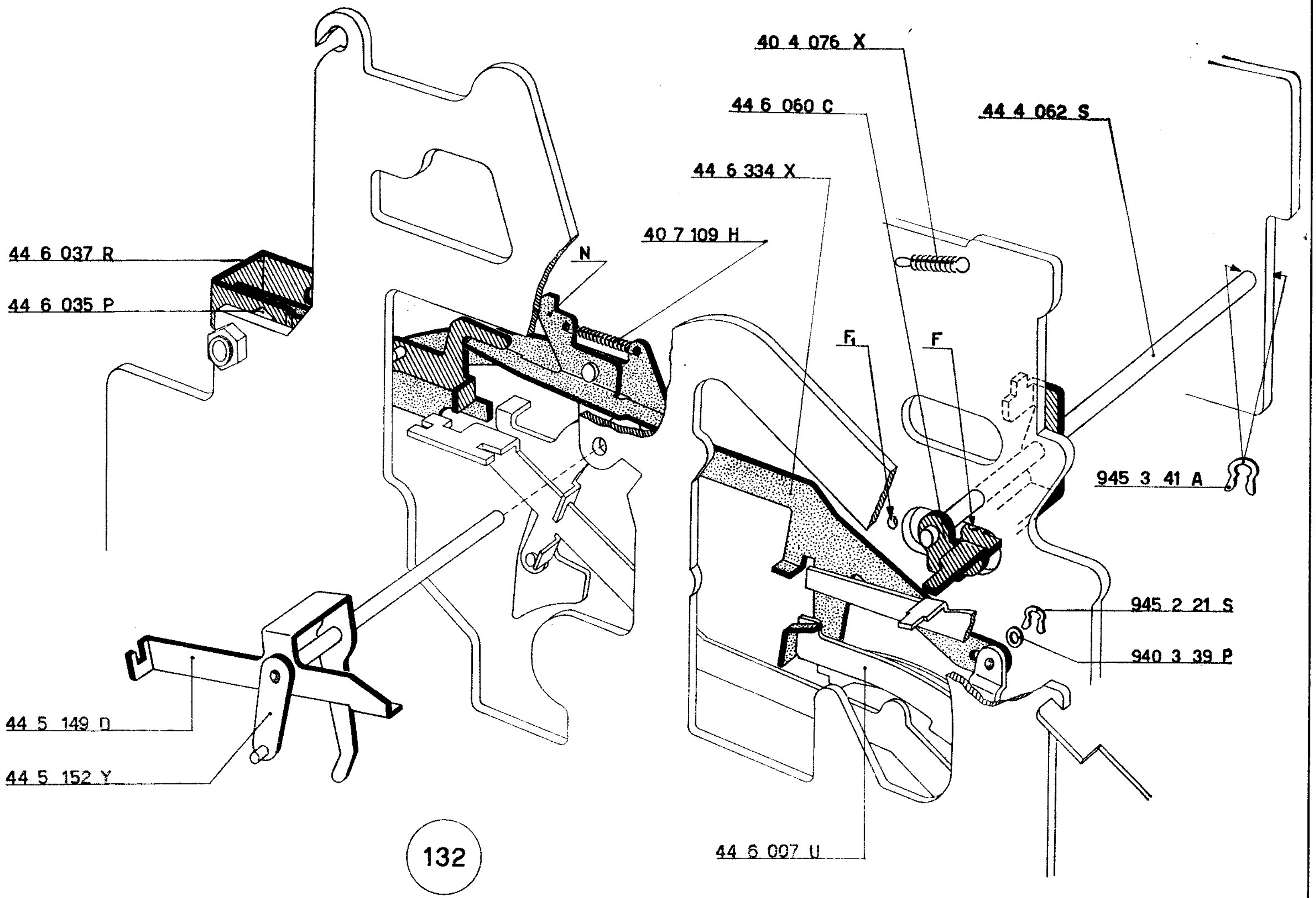
b) On the ring 44 6 035 P, place the partial printing control hook 44 6 037 R.

c) Between the division connecting-rod 44 6 334 X and the prope pawl **N**, hook the spring 40 7 109 H.

d) Assemble, as illustrated in the figure, the connecting rod 44 6 334 X by connecting it to the crank 44 6 007 U. Secure with a spring clip 945 2 21 S and by interposing the washer 940 3 39 P.

e) Assemble again the engagement control arm 44 5 152 Y on which shaft should be place the bridge 44 5 149 D.

44 5 149 D	Engagement anchor control bridge
44 5 152 Y	Engagement control arm
44 6 007 U	Division connecting-rod stop crank (current control)
44 6 035 P	Division connecting-rod guide ring
44 6 037 R	Partial restoring and printing control hook
44 6 060 C	Hook-bridge
44 6 062 S	Shaft for bridge 44 6 060 C
44 6 334 X	Division connecting-rod with stop pawl
44 4 076 X	Spring for 44 6 060 C
40 7 109 H	Spring for division connecting-rod
940 3 39 P	Washer
945 2 21 S	Spring clip
945 3 41 A	Spring clip


40 4 076 X
44 6 060 C
44 4 062 S
44 6 334 X
40 7 109 H
N
44 6 037 R
44 6 035 P
F1
F
945 3 41 A
945 2 21 S
940 3 39 P
44 5 149 D
44 5 152 Y
44 6 007 U

132

110 - FIGURE 133

Assembling the racks control engagement cam-lever.

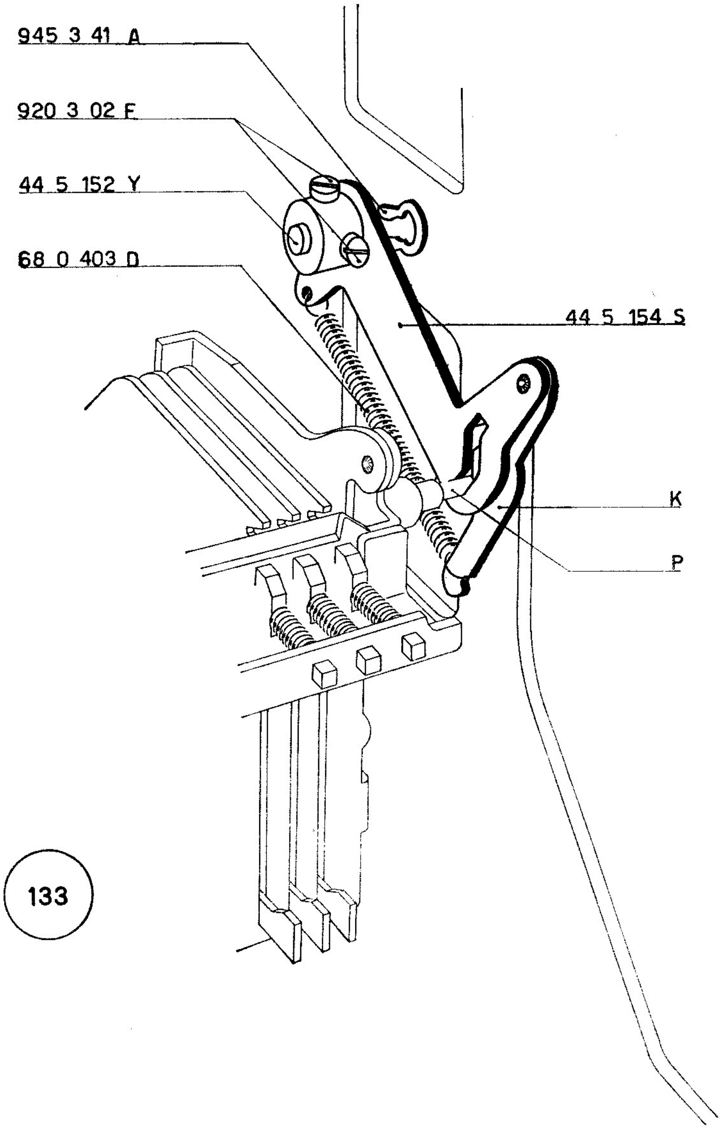
a) Secure the shaft of the engagement control arm 44 5 152 Y (assembled in the precedent paragraph) by means of a spring-clip 945 3 41 A.

b) On the same shaft place the racks control engagement cam-lever 44 5 154 S with the appropriate two screws 920 3 02 F. In the slot of the lever should be placed the pivot **P** of the racks unit.

The stabilizer **K** should rest on the pivot **P**.

c) Hook the spring 68 0 403 D between the stabilizer **K** and the lever.

44 5 152 Y	Engagement control arm
44 5 154 S	Racks control engagement cam-lever
68 0 403 D	Spring for 44 5 154 S
920 3 02 F	Screw for 44 5 154 S
945 3 41 A	Spring clip for 44 5 152 Y


945 3 41 A
920 3 02 F
44 5 152 Y
68 0 403 D
44 5 154 S
K
P
133

111 - FIGURE 134

Assembling the division stop connecting-rod and its hook.

a) Disassemble the comb 44 5 180 Z (see the figure 115).

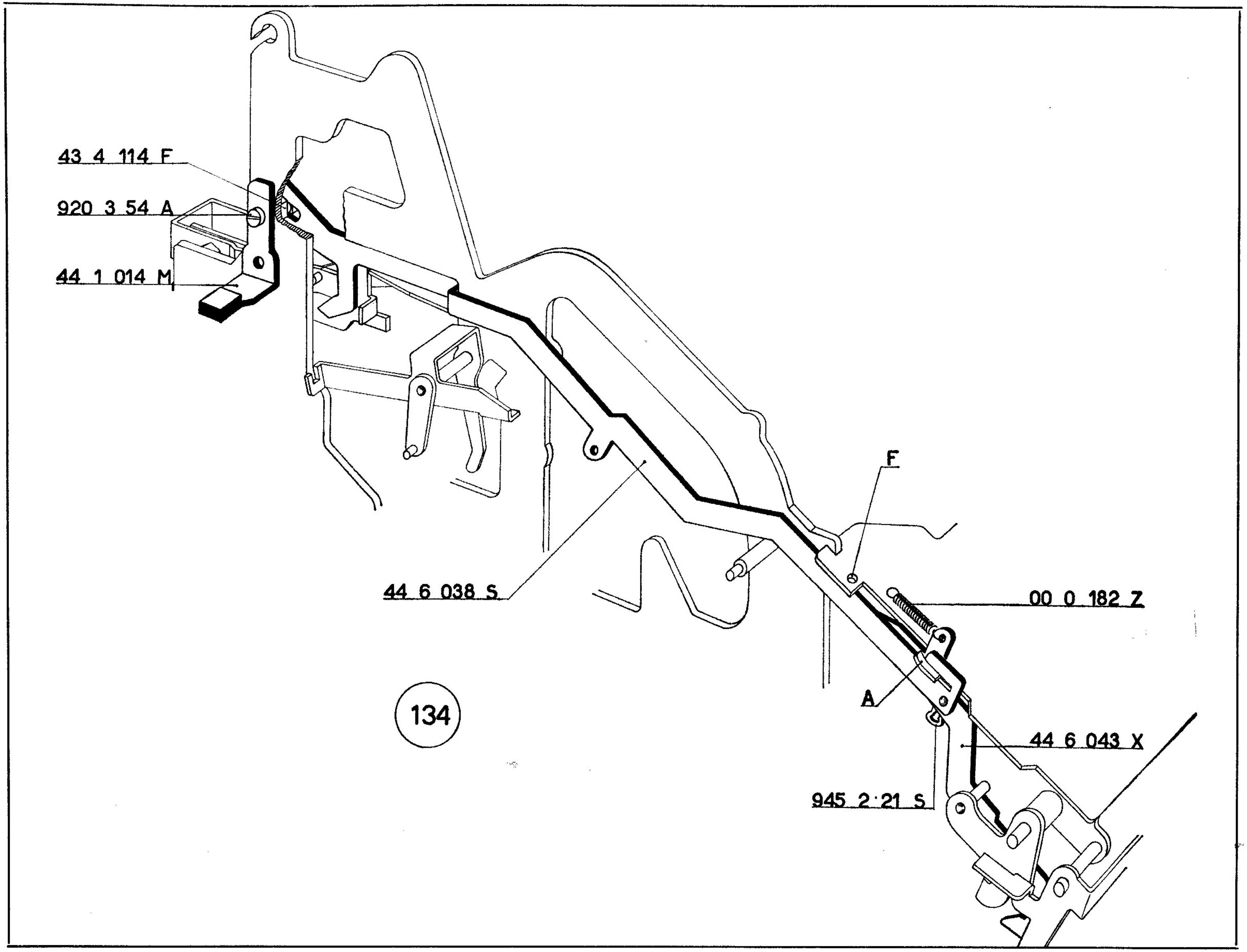
b) Assemble on the left external side-plate of the machine the casing left support 44 1 014 M by means of a screw 920 3 54 A and of the special nut 43 4 114 F.

c) Assemble the division stop connecting-rod 44 6 038 S which should take the position illustrated in the figure. At the rear, it must be guided by the special nut 43 4 114 F; at the front, it must be placed in the wing **A** of the keyboard upper plate.

d) Assemble the hook of the division stop connecting-rod 44 6 043 X which must be connected to the 44 6 038 S and then secured with a spring-clip 945 2 21 S.

e) Hook the spring 00 0 182 Z to the hook 44 6 043 X. The other end must be hooked to the hole **F** of the keyboard upper plate.

44 1 014 M	Casing left support
44 6 038 S	Division stop connecting-rod
44 6 043 X	Hook for division stop connecting-rod
00 0 182 Z	Spring for 44 6 043 X
43 4 114 F	Special nut
920 3 54 A	Setting screw for 44 1 014 M
945 2 21 S	Spring-clip


43 4 114 F
920 3 54 A
44 1 014 M
44 6 038 S
F
00 0 182 Z
A
44 6 043 X
945 2 21 S

134

112 - FIGURE 135

Adjusting the division connecting-rod release bridge.

a) Move the main shaft to rest.

b) Rotate the division connecting-rod release bridge 44 6 026 N *thus moving it to contact the pivot* **P1** *of the « division control » key* 44 4 002 V; *rotate the crank* 44 6 007 U *so that its pivot* **P** *is in contact with the bottom of the front slot of the connecting-rod* 44 6 334 X. *In these conditions move angularly the arm* 44 6 006 T *to obtain the reading shown in the figure. Then tighten the screws of the bridge* 44 6 007 U.

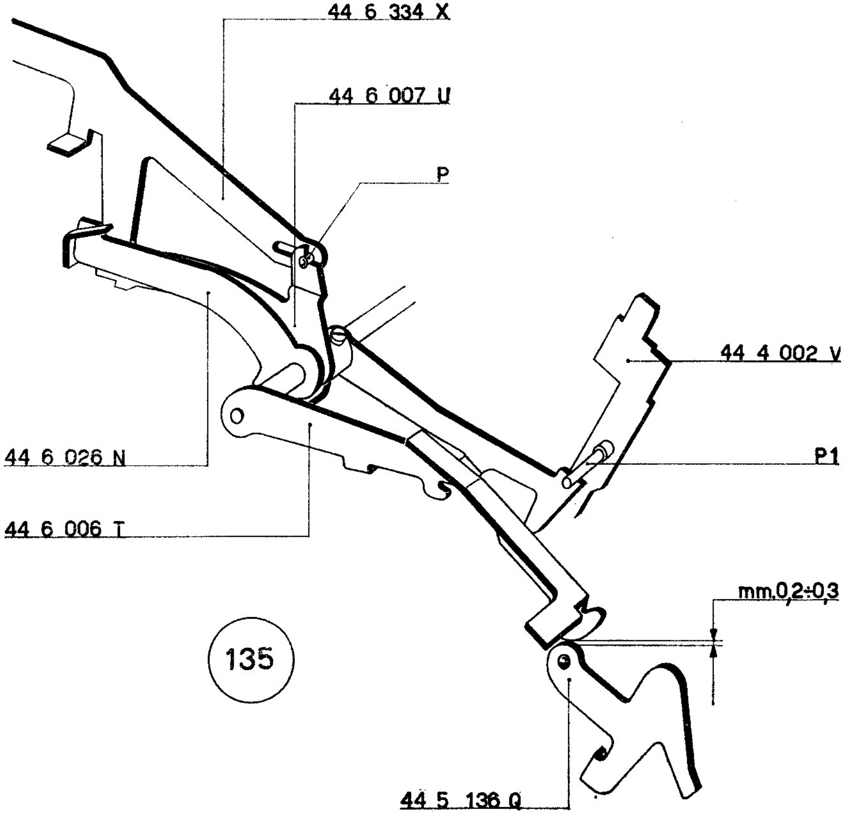
113 - FIGURES 136 and 137

Adjusting the current release bridge and the current control intercepted arm.

a) With the machine at rest adjust the angular position of the arm 44 6 005 S *to obtain the reading shown in the figure* 136. *Tighten the screws of the arm* 44 6 005 S.

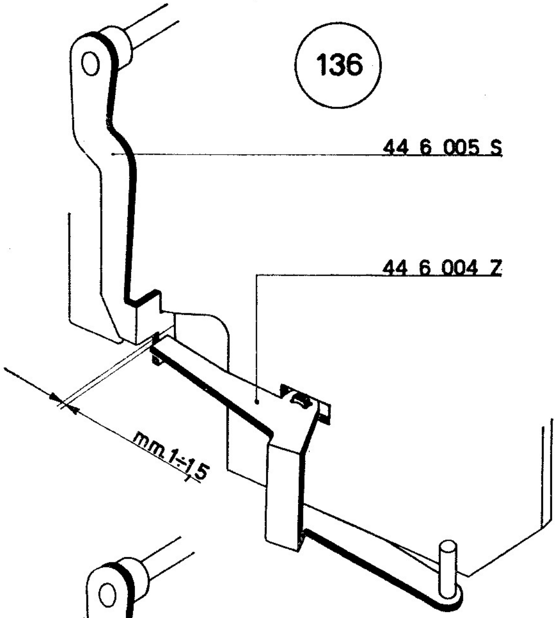
b) Rotate the bridge 44 6 004 Z *thus moving its pivot* **P** *to contact the side-plate of the machine. We should obtain the reading shown in the figure* 137. *Act if necessary on the same* 44 6 004 Z.

44 4 002 V	« Division control » key
44 5 136 Q	Current left crank
44 6 004 Z	Current release bridge
44 6 005 S	Current control intercepted arm
44 6 006 T	Current control arm
44 6 007 U	Division connecting-rod stop crank (current control)
44 6 026 N	Division connecting-rod release bridge
44 6 334 X	Division connecting-rod with stop pawl



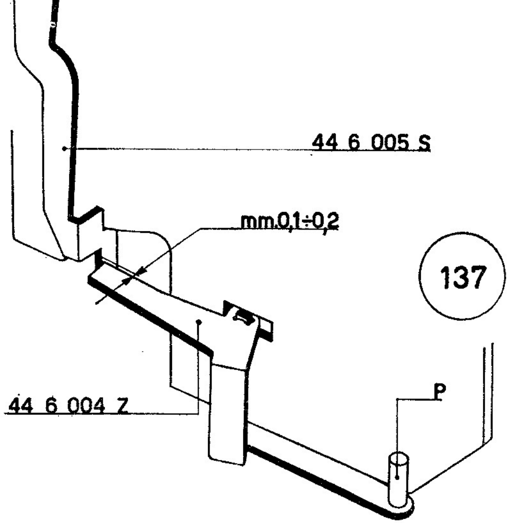
44 6 334 X
44 6 007 U
P
44 4 002 V
P1
44 6 026 N
44 6 006 T
mm.0,2÷0,3
44 5 136 Q

135



44 6 005 S
44 6 004 Z
mm.1÷1,5

136



44 6 005 S
mm.0,1÷0,2
44 6 004 Z
P

137

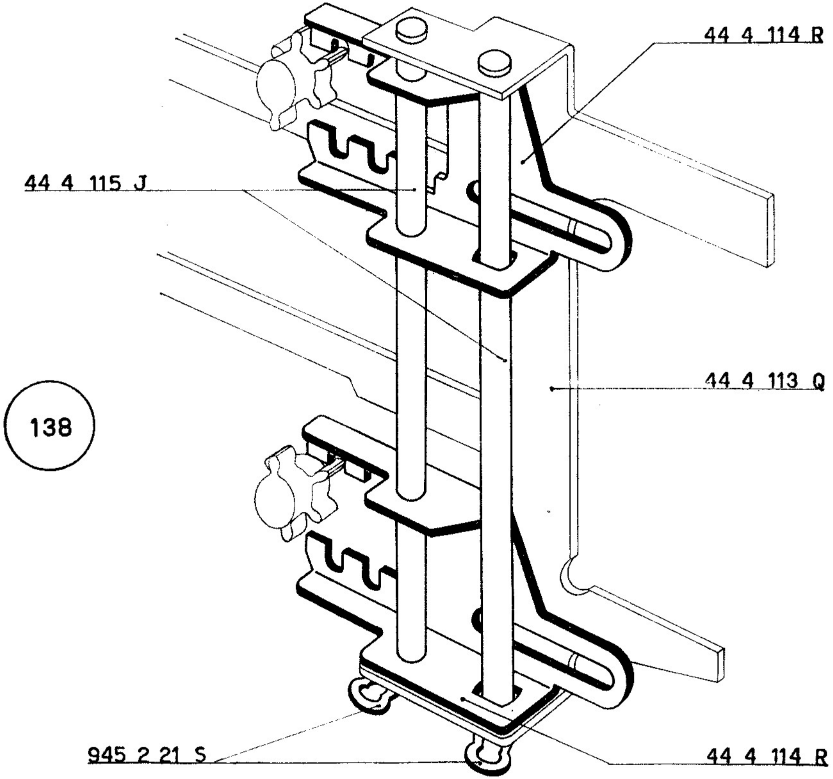
114 - FIGURE 138

Assembling the registers inversion plates.

a) In the appropriate upper holes of the registers inversion control plate 44 4 113 Q insert the two small shafts 44 4 115 J on which must be placed the two small plates 44 4 114 R.

b) Make the two small shafts project from the lower holes of the plate and set them with two spring-clips 945 2 21 S.

44 4 114 R	Registers inversion control plate
44 4 113 Q	Registers inversion plate
44 4 115 J	Guide shaft for registers inversion plates
945 2 21 S	Spring-clip for 44 4 115 J


44 4 114 R
44 4 115 J
44 4 113 Q
138
945 2 21 S
44 4 114 R

115 - FIGURES 139 and 140

Assembling the first register subtraction control right arm.

a) In the appropriate guide hole of the right external side-plate insert the shaft of the arm 44 4 334 V (figure 140) on which should be placed:

— the first register calculation slider stop 44 5 194 K. Its rear arm must be placed under the pivot **P** of the control plate 44 4 105 Z

— the credit balance rocker control crank 44 3 071 Y with the screws 920 3 02 F

— the reinforcing plate 52 6 115 C.

b) Disassemble the stud-screw 926 3 54 U which supported temporarily the first register stabilizer 44 4 091 N (figure 24).

c) Still advance the arm 44 4 334 V and pivot the above stabilizer (figure 139). Place the arm 44 4 334 V in the proper guide slot of the bracket 44 5 178 A (figure 140).

d) Place at last on the shaft of the arm 44 4 334 V, the subtraction control left arm 44 4 029 X with the screws 922 3 02 V. The pivot **K** of the arm 44 4 029 X should be placed in the slot of the small lower plate 44 4 114 R.

e) On the shaft of the arm 44 4 334 V place the spring-clip 945 2 51 G.

Push the shaft leftward and adjust the position of the arm 44 4 029 X *to leave a very little axial play to this shaft.*

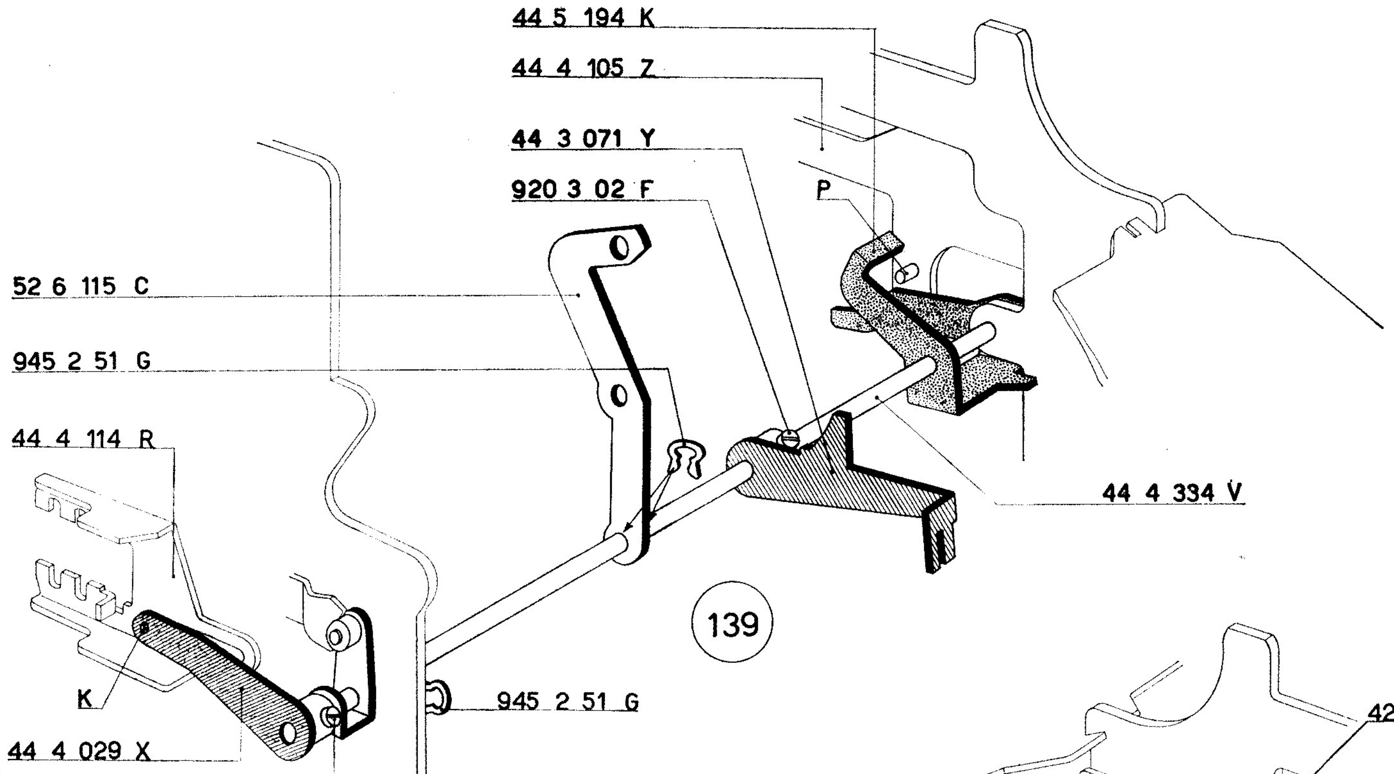
Tighten but not right home the screw of the arm 44 4 029 X.

f) Between the stop 44 5 194 K and the arm 44 5 127 P, hook the spring 42 2 042 N (figure 140).

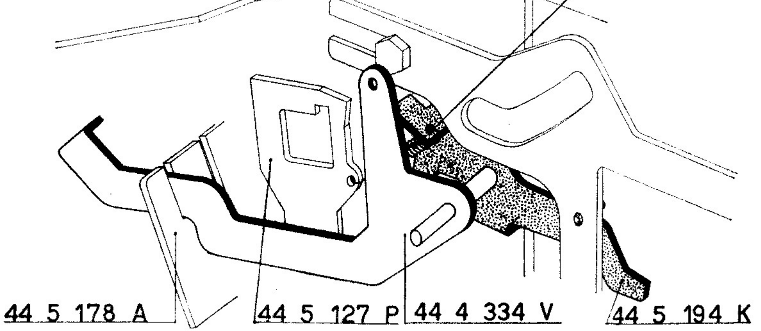
g) Secure the small reinforcing plate 52 6 115 C by means of two spring-clips 945 2 51 G.

44 3 071 Y	First register credit balance rocker control crank
44 4 029 X	Subtraction control left arm
44 4 105 Z	Control plate
44 4 114 R	Register inversion plate
44 4 334 V	First register subtraction control right arm
44 5 127 P	Servomechanism totals control arm

44 5 178 A	Right arms guide bracket
44 5 194 K	First register calculation slider stop
42 2 042 N	Spring for 44 5 194 K - 44 5 127 P
52 6 115 C	Reinforcing plate
920 3 02 F	Screw for 44 3 071 Y
922 3 02 V	Screw for 44 4 029 X
945 2 51 G	Spring-clip


44 5 194 K
44 4 105 Z
44 3 071 Y
920 3 02 F
P
52 6 115 C
945 2 51 G
44 4 114 R
K
44 4 029 X
922 3 02 V
945 2 51 G
44 4 334 V

139


42 2 042 N
44 5 178 A
44 5 127 P
44 4 334 V
44 5 194 K

140

116 - FIGURE 141

Assembling the credit balance transfer bridge.

a) Introduce in the appropriate guide hole of the right external side-plate, correctly orientated, the shaft 52 1 255 T on which is to be placed the credit balance transfer bridge 52 6 109 X.

The shaft should be inserted in the central hole of the reinforcing plate 42 6 115 C and should be therefore placed in the proper guide hole of the left internal side-plate.

b) Secure:

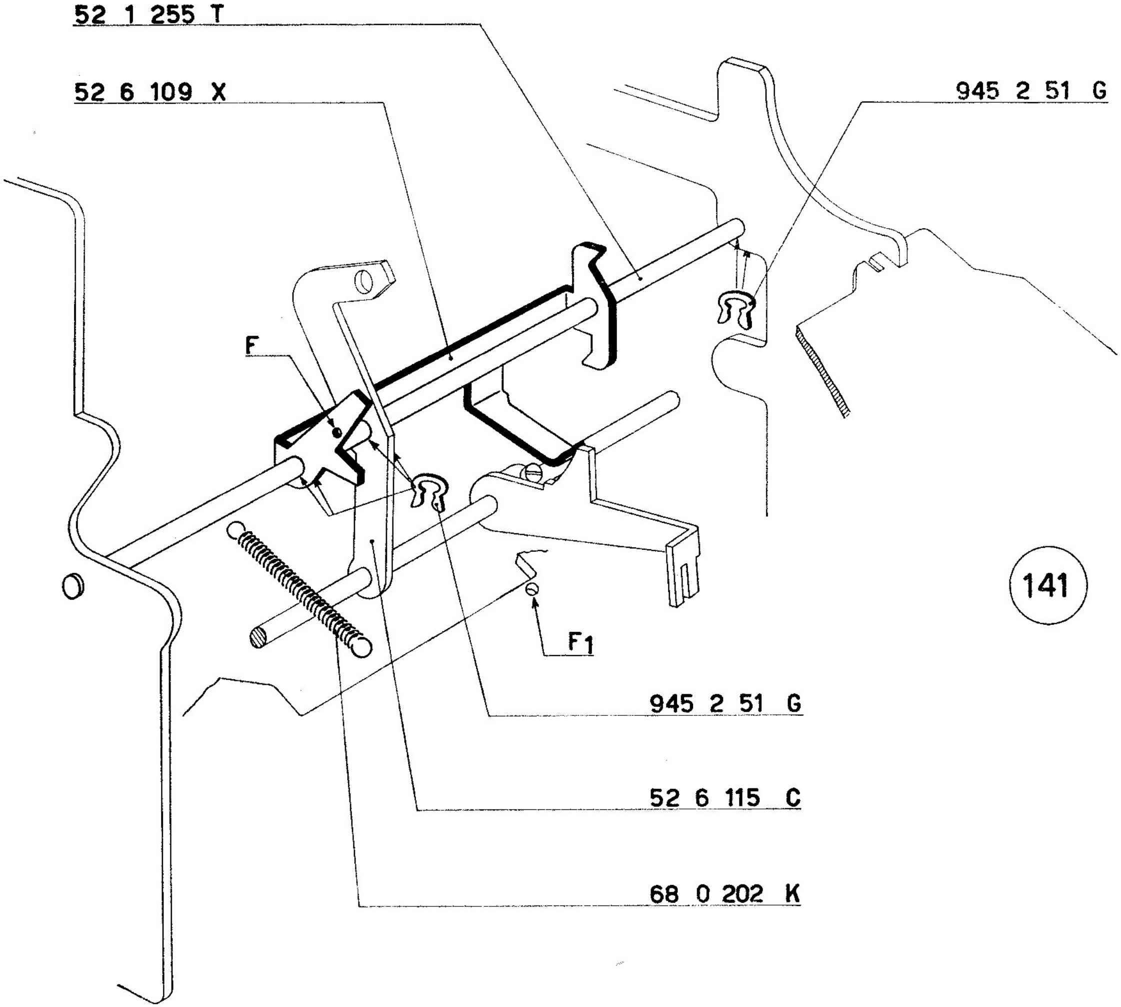
— the shaft 52 1 255 T

— the bridge 52 6 109 X

— the small reinforcing plate 52 6 115 C by means of six spring-clips 945 2 51 G.

c) Between the hole **F** of the bridge 52 6 109 X and the hole **F1** of the keyboard upper plate, hook the spring 68 0 202 K.

52 1 255 T	Shaft for 52 6 109 X
52 6 109 X	Credit balance transfer bridge
52 6 115 C	Reinforcing plate
68 0 202 K	Spring for 52 6 109 X
945 2 51 G	Spring-clip


52 1 255 T
52 6 109 X
945 2 51 G
F
F1
945 2 51 G
52 6 115 C
68 0 202 K
141

117 - FIGURES 142 - 143 - 144

Assembling the total inversion control right arm.

a) In the appropriate guide hole of the right external side-plate of the machine insert the shaft of the total inversion control right arm 44 4 416 Q. Place on it (figure 142):

— the totals and calculation slider control crank 44 4 121 Q with the screw 922 3 02 V
— the first register credit balance indicator bridge 52 6 107 M
— the repeat crank 44 4 042 U with the screw 922 3 02 V
— the second register credit balance indicator bridge 52 6 122 B
— the collar 942 5 27 J with the screw 920 2 12 U
— the restoring lever 52 6 020 L with the screw 920 3 02 F
— the date key 44 7 008 E precedently assembled
— the special hub 44 6 055 T with the screw 920 3 02 F. The chamfered part of the hub must be inserted in the hole of the bridge 44 6 029 Z precedently assembled
— the total inversion control left arm 44 4 098 V with the screw 922 3 02 V and 923 3 02 W.

The roller **R** of the arm 44 4 416 Q must be inserted in the slot of the control plate 44 4 105 Z (figure 143).

Hook the spring 40 7 204 G between the bridge 44 6 029 Z and the shaft 44 4 115 I.

b) *Center the roller* **R** *of the arm* 44 4 416 Q *with respect to the control plate* 44 5 105 Z *(figure* 143*). In these conditions move axially the arm* 44 4 098 V *and the special hub* 44 6 055 T *to leave a very little axial play to the shaft of the same arm* 44 4 416 Q. *Tighten home, the screws of the arm* 44 4 098 V.

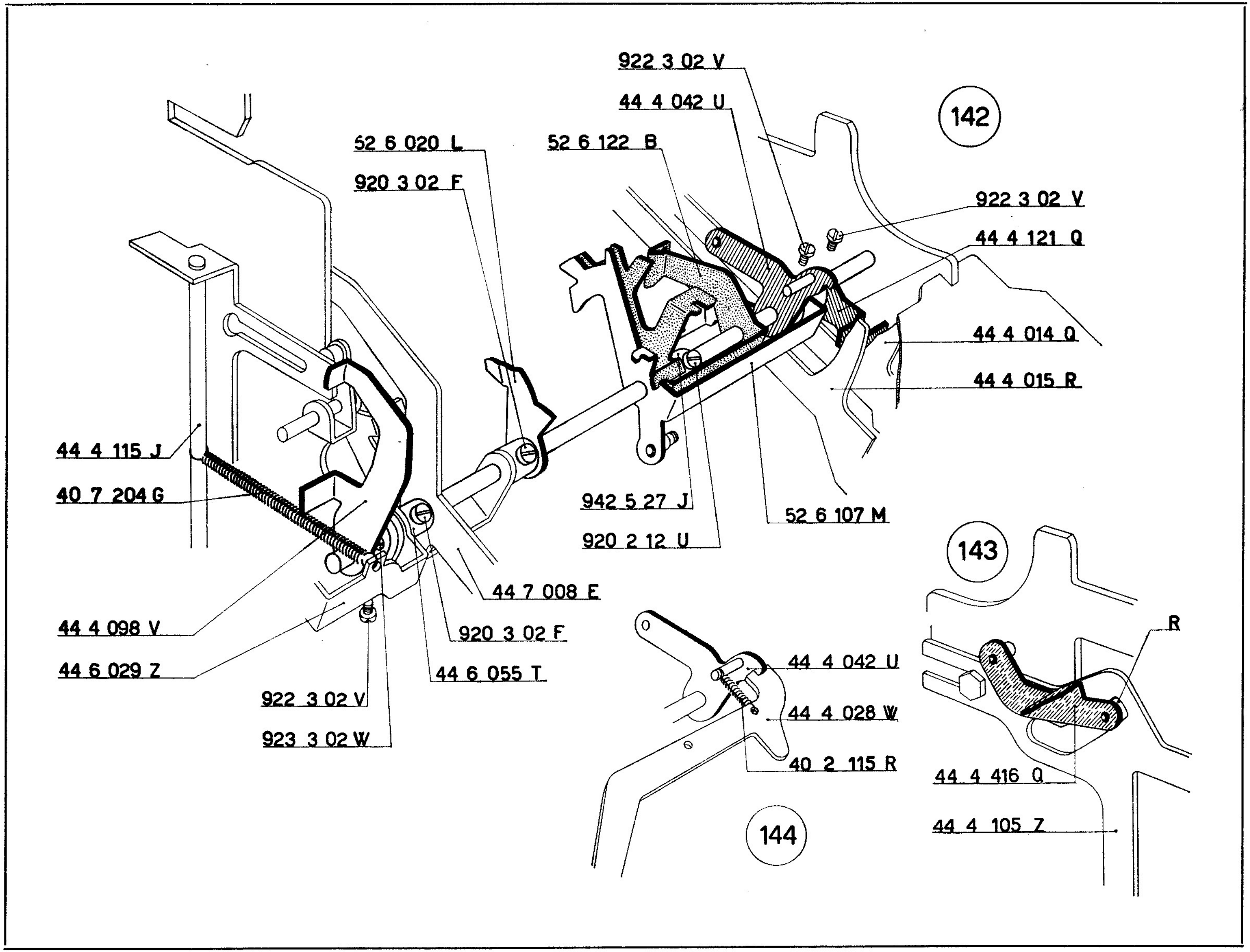
c) *Move axially the crank* 44 4 121 Q *to that its extensions are centered with respect to the extensions of the sliders* 44 4 014 Q *and* 44 4 015 R. *Tighten, but not right home, the screws of the crank.*

d) *Move axially the repeat crank* 44 4 042 U *so that its front extension is quite centered with respect to the extension of the lever* 44 4 028 W *(figure* 144*). Tighten, but not right home, the screw of the crank.*

e) *Move axially the collar* 942 5 27 J *to reduce to a minimum the axial play of the two bridges* 52 6 107 M *and* 52 6 122 B. *Tighten, but not right home, the screw of the collar.*

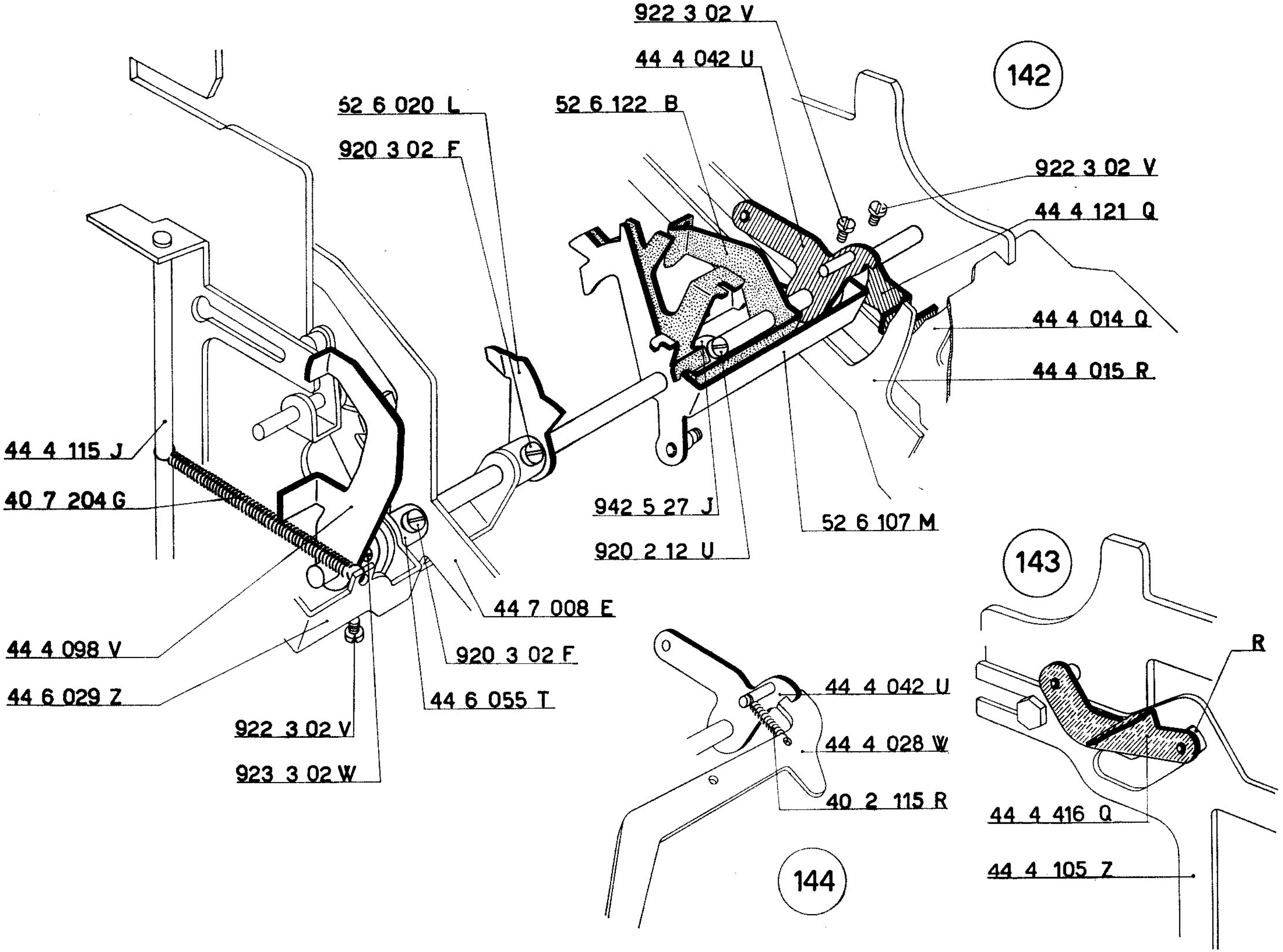
f) *Move axially the restoring lever* 52 6 020 L *to reduce to a minimum the axial play of the date key* 44 7 008 E. *Tighten, but not right home, the screw of the lever.*

g) Between the pivot of the crank 44 4 042 U and the lever 44 4 028 W, hook the spring 40 2 115 R.


922 3 02 V
44 4 042 U
142
52 6 020 L
52 6 122 B
920 3 02 F
922 3 02 V
44 4 121 Q
44 4 014 Q
44 4 015 R
44 4 115 J
40 7 204 G
942 5 27 J
52 6 107 M
920 2 12 U
143
44 7 008 E
R
44 4 098 V
920 3 02 F
44 6 029 Z
44 6 055 T
44 4 042 U
922 3 02 V
44 4 028 W
923 3 02 W
40 2 115 R
44 4 416 Q
44 4 105 Z
144

44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and calculation slider
44 4 028 W	Non-print and repeat release transmission lever
44 4 042 U	Non-print and repeat crank
44 4 098 V	Total inversion control left arm
44 4 105 Z	Control plate
44 4 121 Q	Totals and calculation sliders control crank
44 4 416 Q	Shaft for total inversion control right arm
44 6 029 Z	Division connecting-rod control exceeding bridge

44 6 055 T	Special hub for 44 6 029 Z
44 7 008 E	Date lever
40 2 115 R	Spring for 44 4 028 W - 44 4 042 U
52 6 020 L	Hook bridge restoring lever
52 6 107 M	First register credit balance indicator bridge
52 6 122 B	Second register credit balance indicator bridge
920 2 12 U	Screw for 942 5 27 J
920 3 02 F	Screw for 44 6 055 T, 52 6 020 L
922 3 02 V	Screw for 44 4 042 U, 44 4 098 V, 44 4 121 Q
923 3 02 V	Screw for 44 4 098 V
942 5 27 J	Collar


142
922 3 02 V
44 4 042 U
52 6 020 L
52 6 122 B
920 3 02 F
922 3 02 V
44 4 121 Q
44 4 014 Q
44 4 015 R
44 4 115 J
40 7 204 G
942 5 27 J
52 6 107 M
920 2 12 U
44 7 008 E
44 4 098 V
920 3 02 F
44 6 029 Z
44 6 055 T
922 3 02 V
923 3 02 W
143
R
44 4 416 Q
44 4 105 Z
44 4 042 U
44 4 028 W
40 2 115 R
144

118 - FIGURE 145

Assembling the first register credit balance rocker.

a) On the pivot of the bridge 52 6 107 M, assemble the first register credit balance rocker 44 3 068 D which should take the position illustrated in the figure.

Secure the rocker by means of a washer 940 3 66 J and a spring-clip 945 2 21 S.

b) Between the rocker 44 3 068 D and the transmission lever 44 4 028 W, hook the spring 40 7 110 V.

119 - FIGURE 146

Assembling the sliders guide comb.

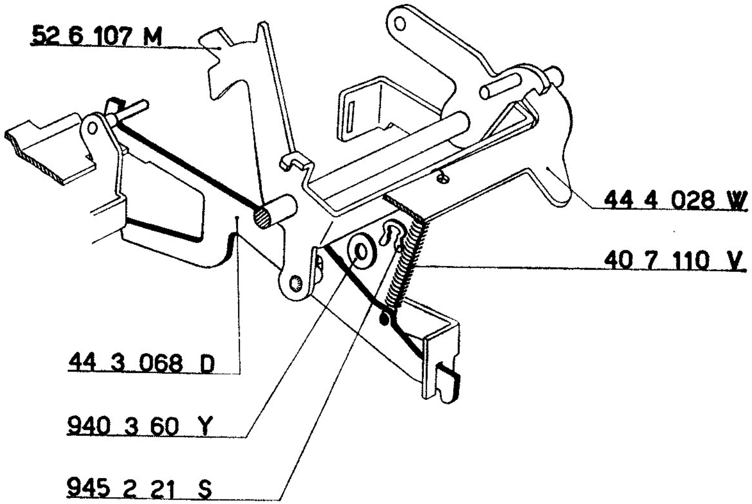
a) Loosen the screw 920 2 11 T which secures, at the rear, the keys-guide support 44 4 032 J to the keyboard upper plate.

b) Assemble the comb 44 4 072 S on the keyboard upper plate; in the slot **F** insert the support 44 4 032 J. In the two lateral slots must be on the contrary inserted the two sliders 44 4 014 Q and 44 4 015 R.

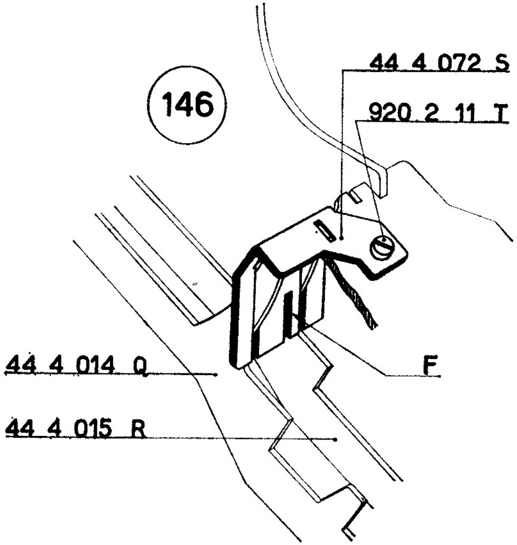
c) Secure the comb 44 4 072 S with the same screw 920 2 11 T.

44 3 068 D	First register credit balance rocker
44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and caluculation slider
44 4 028 W	Non-print and repeat transmission lever
44 4 072 S	Sliders guide comb
40 7 110 V	Spring for 44 3 068 D
52 6 107 M	First register credit balance indicator bridge
920 2 11 T	Setting screw for 44 4 072 S
940 3 66 J	Washer
945 2 21 S	Spring-clip

145


52 6 107 M
44 4 028 W
40 7 110 V
44 3 068 D
940 3 60 Y
945 2 21 S

146


44 4 072 S
920 2 11 T
44 4 014 Q
F
44 4 015 R

120 - FIGURE 147

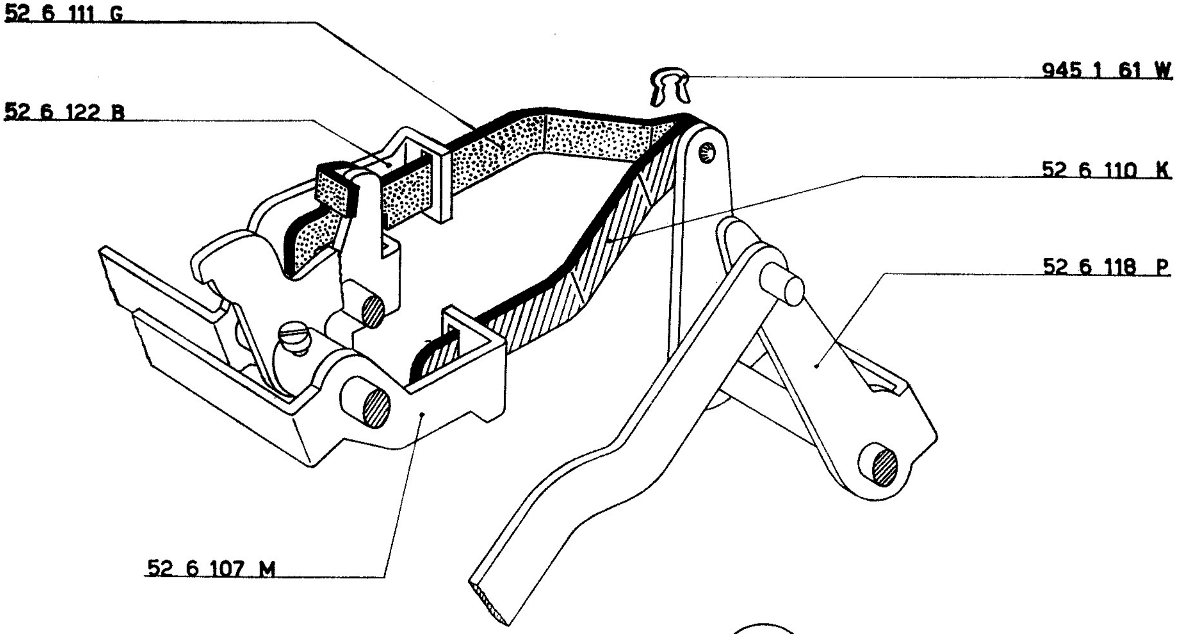
Assembling the subtraction control stays.

a) In the appropriate slot of the bridge 52 6 107 M insert the first register subtraction control stay 56 6 110 K.

b) In the appropriate slot of the bridge 52 6 122 B insert the second register subtraction control stay 52 6 111 G.

c) Place the two stays on the proper pivot of the credit alance control bridge 52 6 118 P. Secure it by means of a spring-clip 945 1 61 W.

52 6 107 M	First register credit balance indicator bridge
52 6 110 K	First register subtraction control stay
52 6 111 G	Second register subtraction control stay
52 6 118 P	Credit balance control bridge
52 6 122 B	Second register credit balance indicator bridge
945 1 61 W	Spring-clip


52 6 111 G
52 6 122 B
945 1 61 W
52 6 110 K
52 6 118 P
52 6 107 M

147

121 - FIGURES 148 - 149 - 150 - 151 - 152

Assembling the second register subtraction control right arm.

a) In the appropriate hole of the right external side-plate of the machine insert the shaft of the second register subtraction control arm 44 4 047 Z on which should be placed successively:

— the first register slider stop control bridge 44 5 386 T

— the second register subtraction control crank 52 6 114 Q with the proper screw 920 3 02 F. The crank should take the position illustrated in the figure 148

— the crank 44 0 021 X with the screw 922 3 02 V which should take the position illustrated in the figure 148

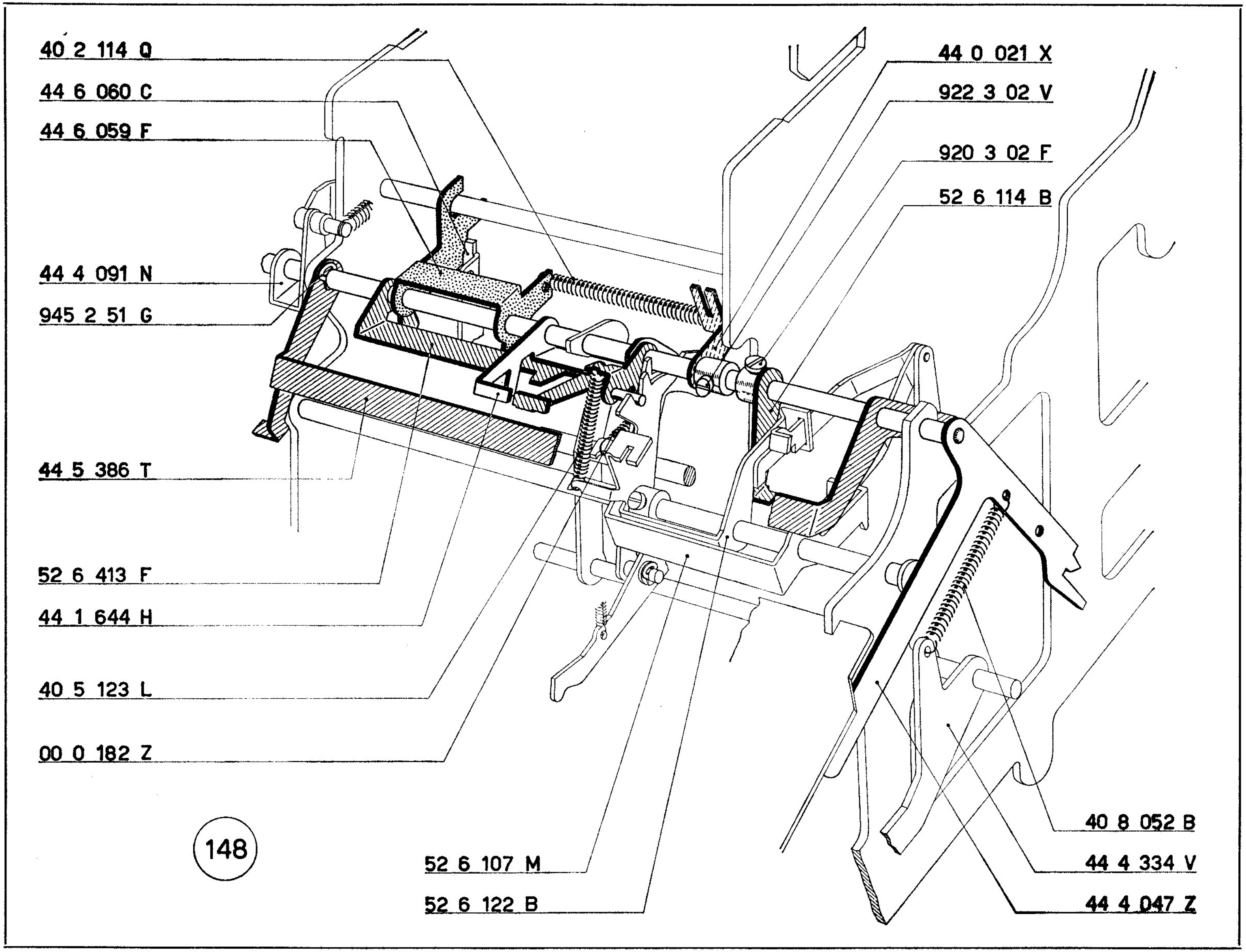
— the second register credit balance indicator 52 6 413 F which should take the position illustrated in the figure 148 (better explained in the figure 149)

— the first register credit balance indicator 44 1 644 H which should take the position illustrated in the figure 148 (better explained in the figure 150)

— the circular transmission exclusion control bridge 44 6 059 F

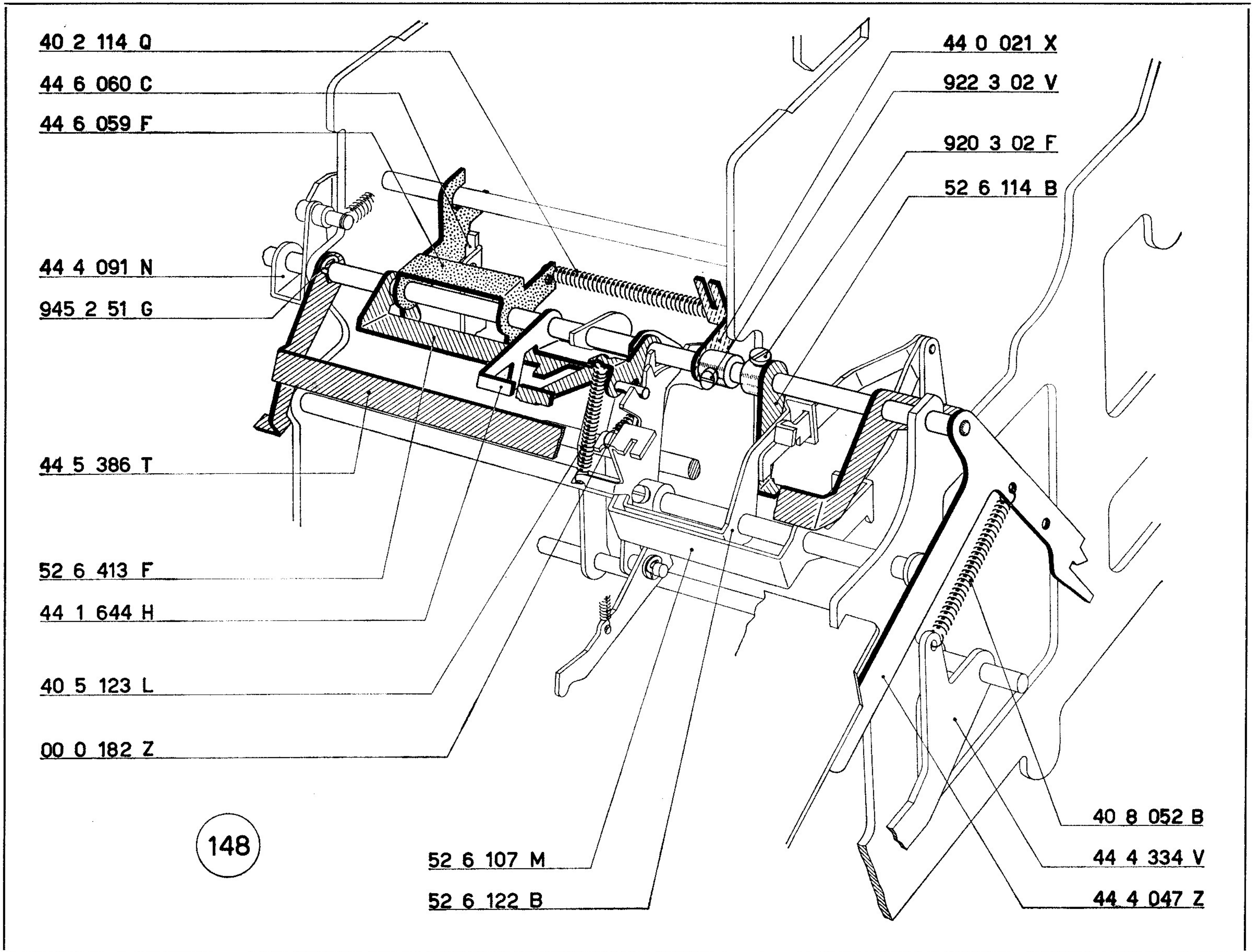
— the register stabilizer 44 4 091 N after having removed the stud-screw 999 1 67 T (figure 29) which supported it temporarily.

(The description of this assembly continues page 346)


40 2 114 Q
44 6 060 C
44 6 059 F
44 4 091 N
945 2 51 G
44 5 386 T
52 6 413 F
44 1 644 H
40 5 123 L
00 0 182 Z
52 6 107 M
52 6 122 B
44 0 021 X
922 3 02 V
920 3 02 F
52 6 114 B
40 8 052 B
44 4 334 V
44 4 047 Z

148

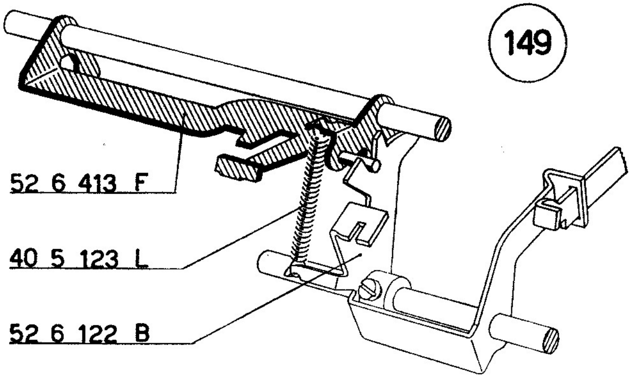
44 0 021 X	Crank for 44 0 019 D
44 1 644 H	First register credit balance indicator bridge
44 4 047 Z	Shaft for the second register subtraction control right arm
44 4 091 N	Register stabilizer
44 4 334 V	First register subtraction control right arm
44 5 386 T	First register slider stop control bridge
44 6 059 F	Circular transmission exclusion control bridge
44 6 060 C	Hook-bridge
00 0 182 Z	Spring for 44 1 644 H - 52 6 107 M
40 2 114 Q	Spring for 44 6 059 F
40 5 123 L	Spring for 52 6 413 F - 52 6 122 B
40 8 052 B	Spring for 44 4 334 V - 44 4 047 Z
52 6 107 M	First register credit balance indicator bridge
52 6 114 B	Second register subtraction control crank
52 6 122 B	Second register credit balance indicator bridge
52 6 413 F	Second register credit balance indicator
920 3 02 F	Screw for 52 6 114 B
922 3 02 V	Screw for 44 0 021 X
945 2 51 G	Spring-clip


40 2 114 Q
44 6 060 C
44 6 059 F
44 4 091 N
945 2 51 G
44 5 386 T
52 6 413 F
44 1 644 H
40 5 123 L
00 0 182 Z
44 0 021 X
922 3 02 V
920 3 02 F
52 6 114 B
52 6 107 M
52 6 122 B
40 8 052 B
44 4 334 V
44 4 047 Z

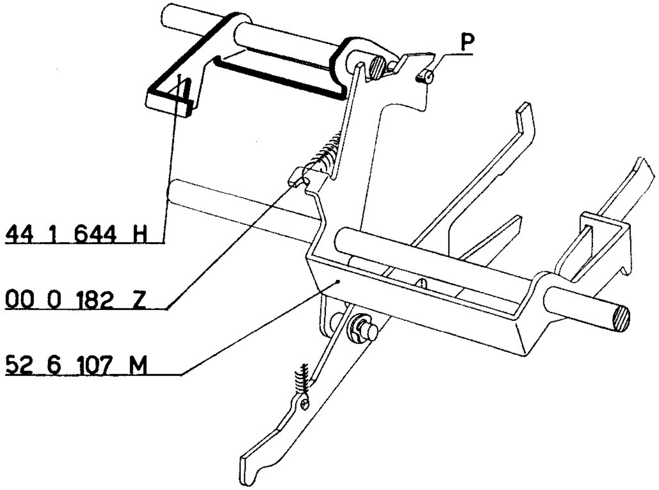
148

44 1 644 H	First register credit balance indicator bridge
44 3 033 J	Setting plate of the transmission bridges
44 6 059 F	Circular transmission exclusion control bridge
00 0 182 Z	Spring for 44 1 644 H - 52 6 107 M
40 2 114 Q	Spring for 44 6 059 F
40 5 123 L	Spring for 52 6 413 F - 52 6 122 B
52 6 107 M	First register credit balance indicator bridge
52 6 122 B	Second register credit balance indicator bridge
52 6 413 F	Second register credit balance indicator

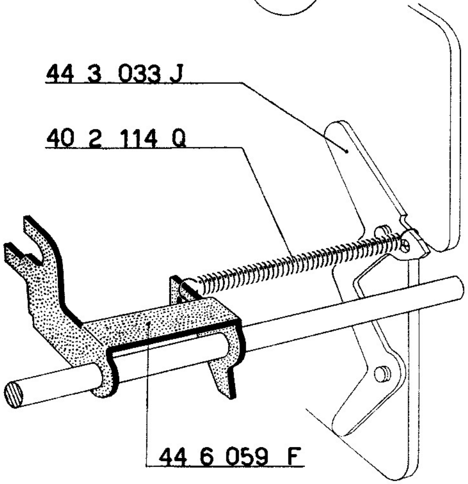
149


52 6 413 F
40 5 123 L
52 6 122 B

150


P
44 1 644 H
00 0 182 Z
52 6 107 M

151


44 3 033 J
40 2 114 Q
44 6 059 F

— the register inversion control left arm 44 4 029 X with the washer 922 3 02 V
— the subtraction arm 44 5 181 N with the screw 922 3 02 V

b) Secure the bridge 44 5 386 T by means of the spring-clip 945 2 51 G (figure 148).

c) Adjust the axial position of the arm 44 4 029 X to reduce to a minimum the axial play of the shaft 44 4 047 Z. Tighten but not right home the screw of the arm.

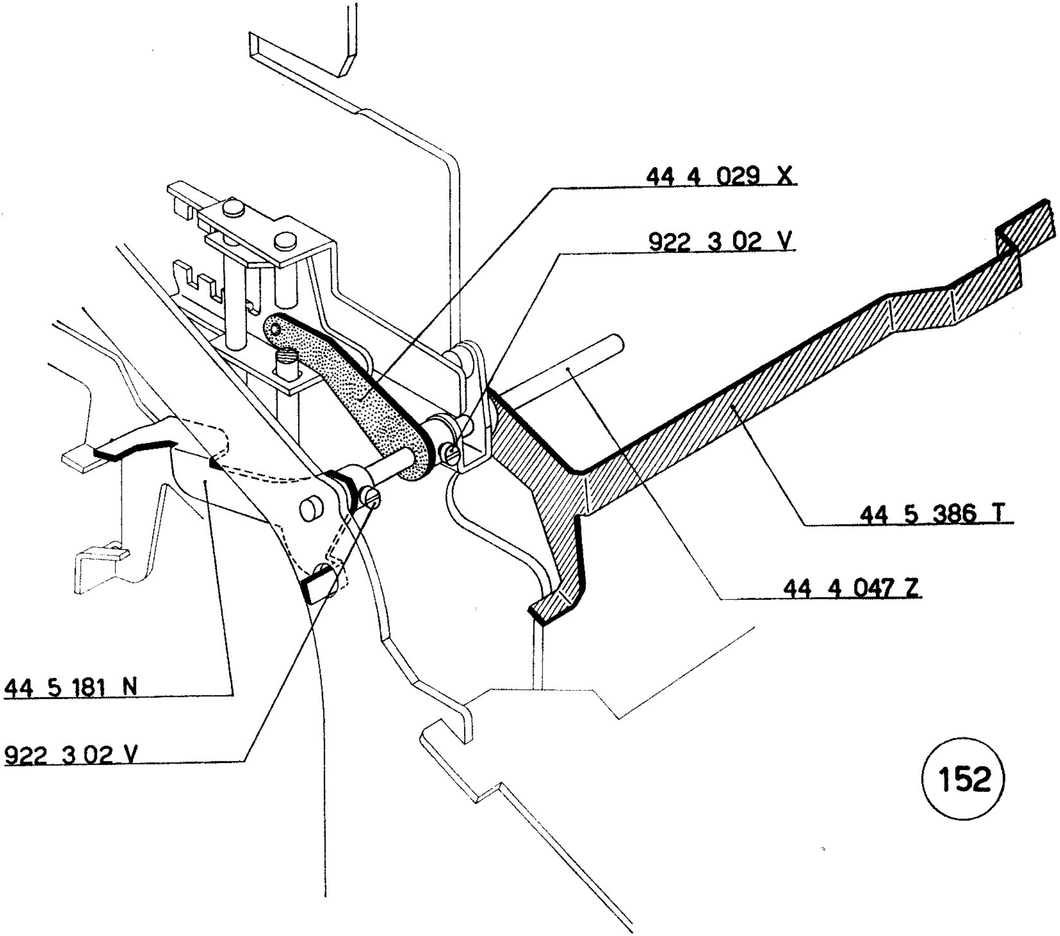
d) Between the bridge 52 6 122 B and the indicator 52 6 413 F, hook the spring 40 5 123 L (figure 149).

e) Between the bridge 52 6 107 M and the pivot **P** of the indicator 44 1 644 H, hook the spring 00 0 182 Z (figure 150).

f) Between the bridge 44 6 059 F and the small plate 44 3 033 J, hook the spring 40 2 114 Q (figure 151).

g) Between the arm 44 4 047 Z and the arm 44 4 334 V, hook the spring 40 8 052 B (figure 148).

44 4 029 X	Subtraction control left arm
44 4 047 Z	Shaft of the second register subtraction control right arm
44 5 181 N	Subtraction arm
44 5 386 T	First register slider stop control bridge
922 3 02 V	Screw for 44 4 029 X - 44 5 181 N


44 4 029 X
922 3 02 V
44 5 386 T
44 4 047 Z
44 5 181 N
922 3 02 V
152

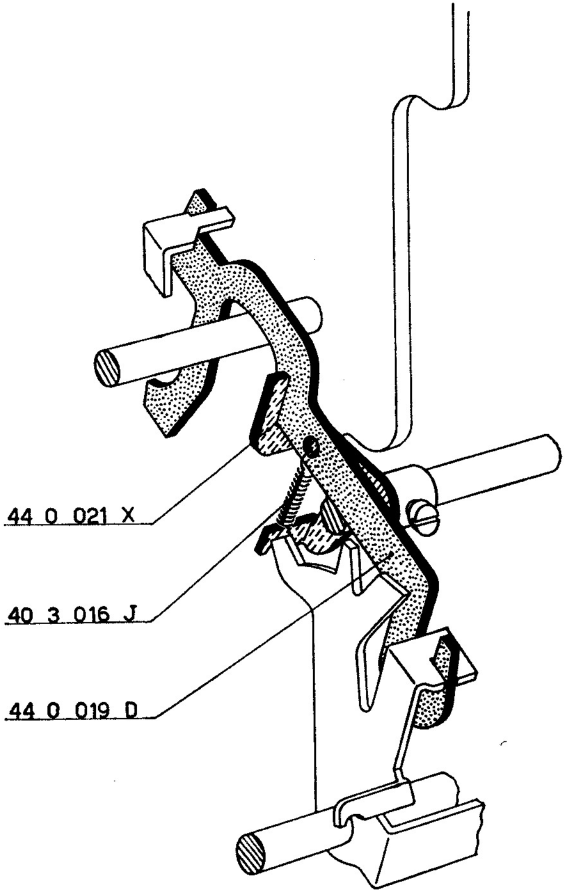
122 - FIGURE 153

Assembling the second register credit balance rocker.

a) Assemble this rocker 44 0 019 D as illustrated in the figure.

b) Between the rocker and the crank 44 0 021 X, hook the spring 40 3 016 J.

44 0 019 D	Second register credit balance rocker
44 0 021 X	Crank for 44 0 019 D
40 3 016 J	Spring for 44 0 019 D - 44 0 021 X


44 0 021 X
40 3 016 J
44 0 019 D

153

123 - FIGURES 154 and 155

Adjusting the axial and angular position of the repeat crank.

a) Move the machine to rest.

b) Adjust the axial position of the repeat crank 44 4 042 U *to obtain the reading* L *shown in the figure* 154..

c) Depress a total key and move the control plate 44 4 105 X *rearward.*

In these conditions (figure 155) *we should obtain the reading* L *which should be equal to that shown in the figure* 154.

Always in these conditions, adjust the angular position of the crank 44 4 042 U *to obtain the clearance of* 0.2 *mm. shown, in the figure* 155.

d) Move the machine back to rest.

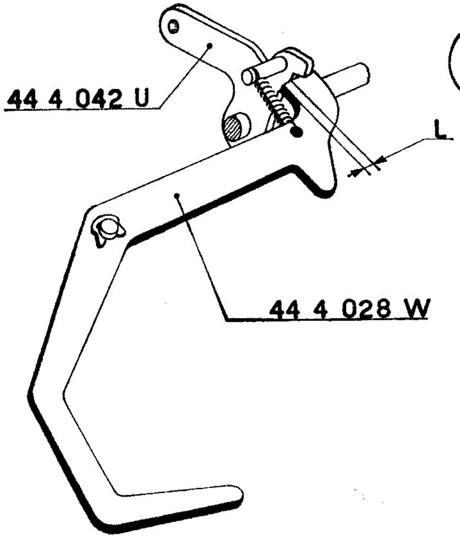
44 4 028 W	Non-print and repeat release transmission lever
44 4 042 U	Non-print and repeat crank
44 4 105 Z	Control plate

124 - FIGURE 156

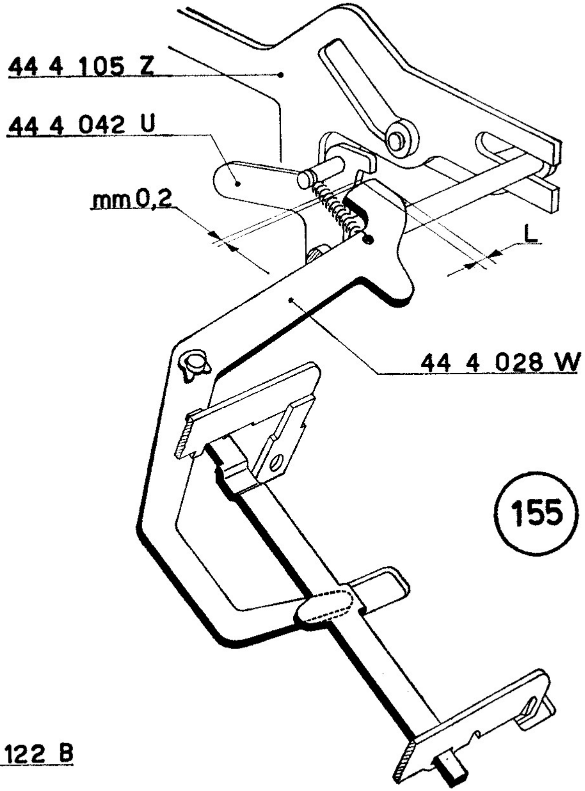
Final adjustment of the axial play of the credit balance indicator bridges.

Adjust the position of the collar 945 2 27 J *to leave a little axial play to the two bridges* 52 6 107 M *and* 52 6 122 B.

52 6 107 M	First register credit balance indicator bridge
52 6 122 B	Second register credit balance indicator bridge
942 5 27 J	Collar

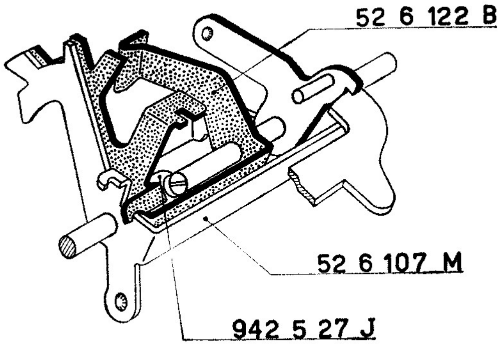

44 4 042 U
L
44 4 028 W

154


44 4 105 Z
44 4 042 U
mm 0,2
L
44 4 028 W

155

156


52 6 122 B
52 6 107 M
942 5 27 J

125 - FIGURES 157 - 158 - 159

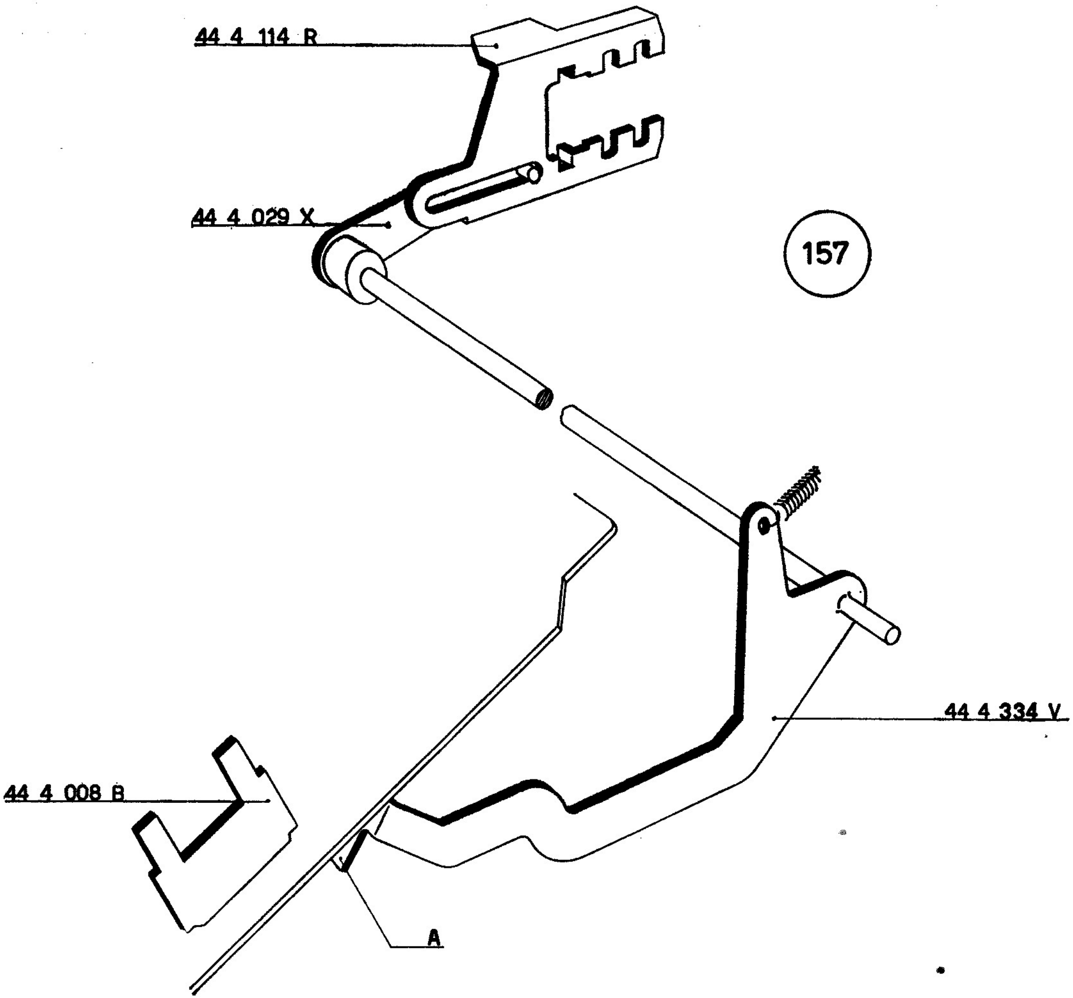
Adjusting the position of the first register inversion plate.

a) Move the main shaft of the machine to rest.

b) Move the wing **A** *of the first register subtraction control right arm to contact with the keyboard plate.*

c) Adjust the angular position of the left arm 44 4 029 X

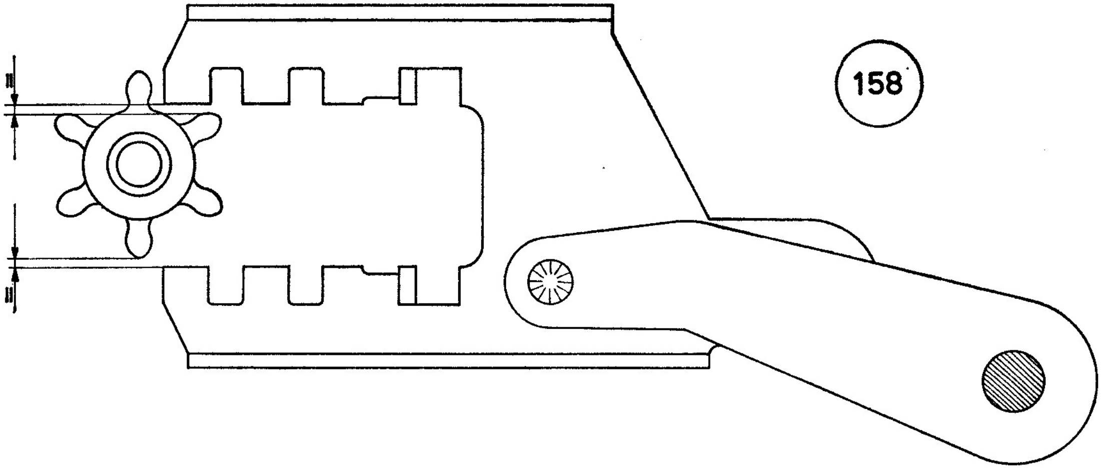
44 4 008 B	First register « subtraction » key-stem
44 4 029 X	Subtraction control left arm
44 4 114 R	Register inversion plate
44 4 334 V	First register subtraction control right arm


44 4 114 R
44 4 029 X
157
44 4 334 V
44 4 008 B
A

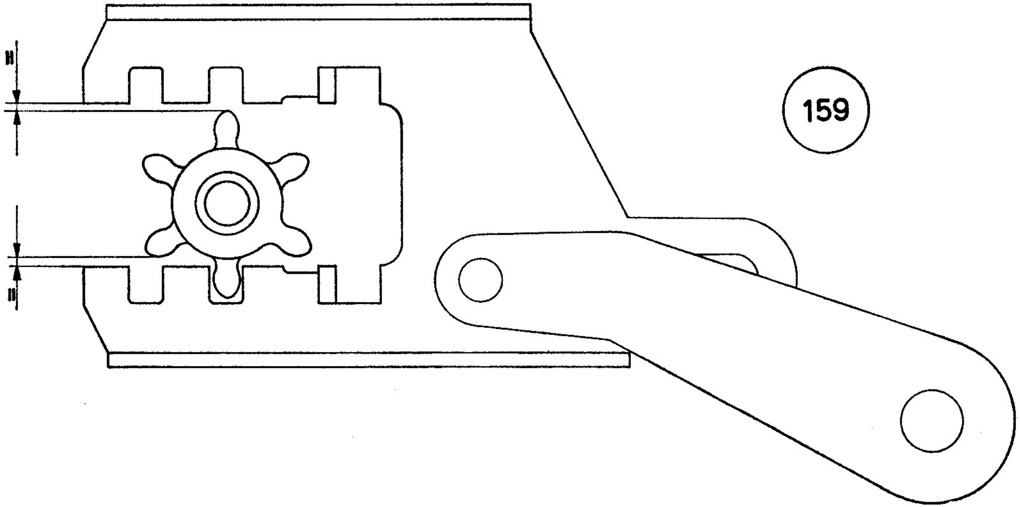
to obtain the conditions shown in the figure 158.

d) Depress the first register subtraction key 44 4 008 B *(figure* 157) *and rotate the main shaft of the machine by about* 90°. *We should obtain the condition illustrated in the figure* 159. *Act if necessary on the wing* A *of the arm* 44 4 334 A *(figure* 157).

c) Move the main shaft back to rest.



158



159

126 - FIGURES 160 and 161

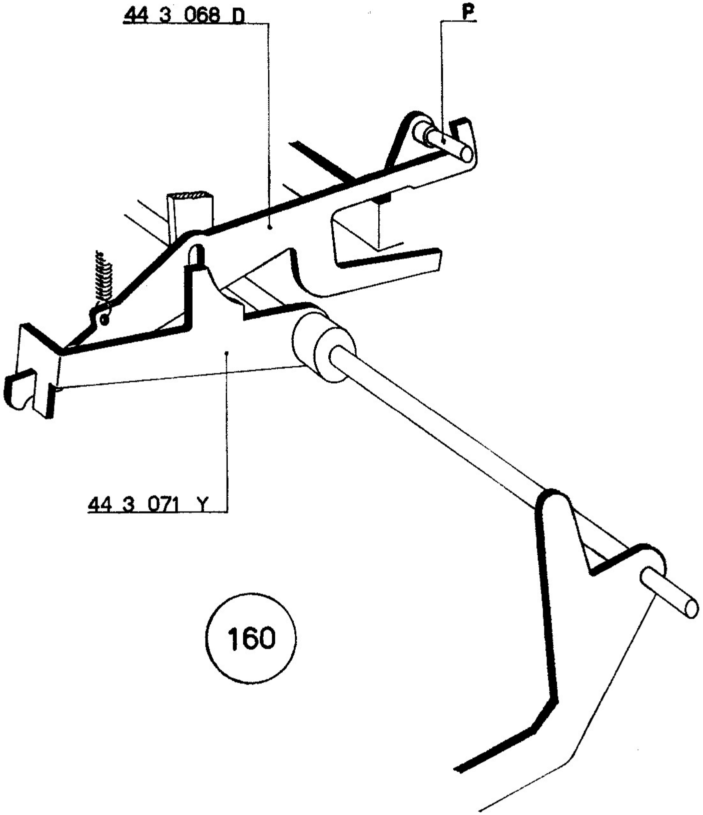
Adjusting the first register credit balance rocker control crank.

a) Depress the first register subtraction key and rotate the main shaft of the machine by about 90°.

d) Adjust the angular position of the crank 44 3 071 Y *(figure* 160*) which establishes, at its turn, the angular position of the rocker* 44 3 068 D. *Between this latter and the pivot* **P** *of the circular transmission bridge we should obtain the clearance of* 0.5 *mm. shown in the figure* 161. *Tighten the screw of the crank and check that the rocker* 44 3 068 D *is parallel to the crank* 44 3 071 Y.

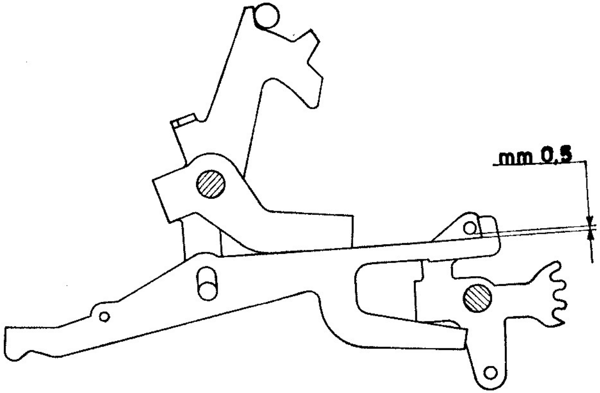
c) Move the main shaft back to rest.

44 3 068 D	First register credit balance rocker
44 3 071 Y	First register credit balance rocker control crank


44 3 068 D
P
44 3 071 Y

160

161



127 - FIGURE 162

Adjusting the position of the second register inversion plate.

a) Move the main shaft of the machine to rest.

b) Move the end **A** *of the second register subtraction control right arm to contact the keyboard plate.*

c) Adjust the angular position of the left arm 44 4 029 X *to obtain the condition illustrated in the figure* 158.

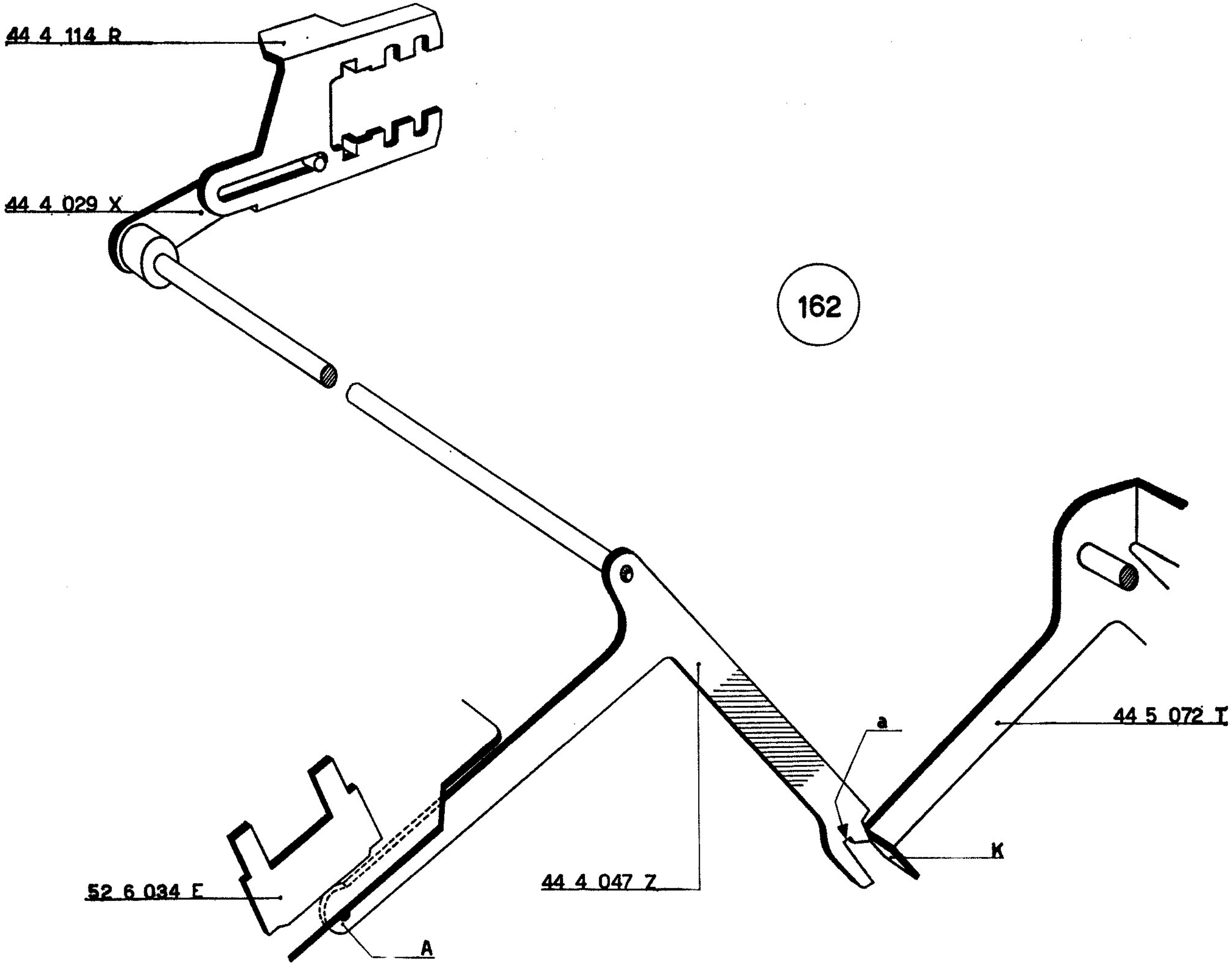
Tighten the screw of the arm 44 4 029 X.

b) Depress the second register subtraction key 43 4 004 M *and rotate the main shaft by about* 90°. *The arm* 44 4 047 Z *should be rotated and will be stopped by the wing* **K** *of the selector* 44 5 072 T *which will be located in the proper opening* **a.**

Check the condition illustrated in the figure 159. *Act if necessary on the hachured part of the arm* 44 4 047 Z.

e) Move the main shaft back to rest.

44 4 029 X	Subtraction control left arm
44 4 047 Z	Shaft for the second register subtraction control right arm
44 4 114 R	Register inversion plate
44 5 072 T	Second register subtraction control selector
52 6 034 E	Second register « subtraction » key-stem


44 4 114 R
44 4 029 X
162
44 5 072 T
a
K
44 4 047 Z
52 6 034 E
A

128 - FIGURES 163 and 164

Adjusting the second register credit balance rocker control crank.

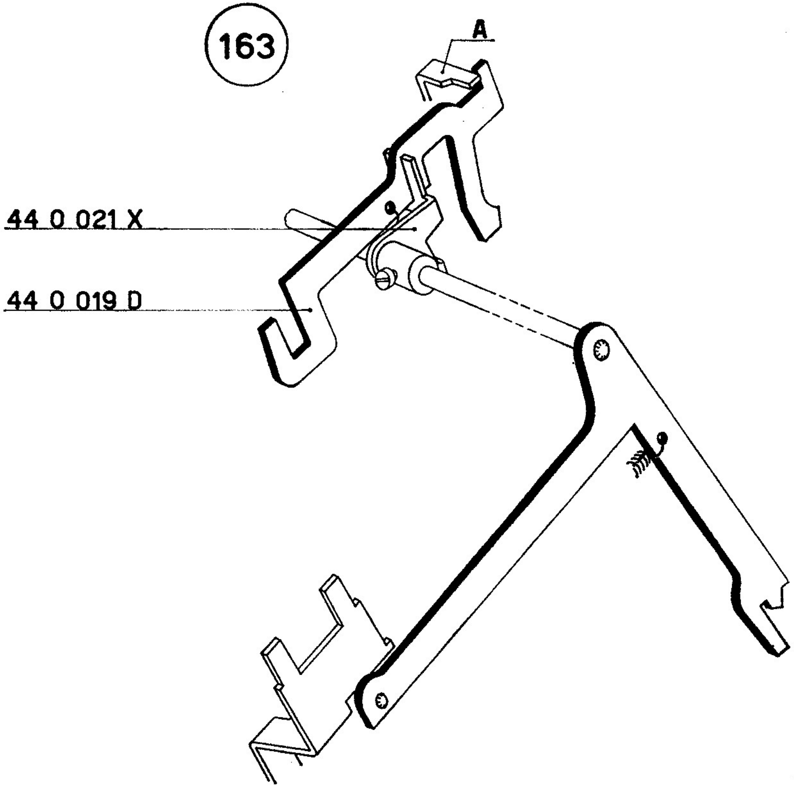
a) Depress the second register « subtraction » key and rotate the main shaft by about 90°.

b) Adjust the angular position of the crank 44 0 021 X *(figure* 163*) which establishes the position of the rocker* 44 0 019 D. *Between this latter and the wing* **A** *of the circular transmission bridge, we must obtain the clearance of* 0.4 *mm. shown in the figure* 163 *(better explained in the figure* 164*).*

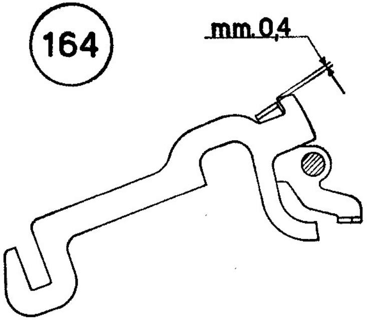
Tighten the screw of the crank 44 0 021 X *checking that the rocker* 44 0 019 D *is parallel to the side-plate of the machine.*

44 0 019 D	Second register credit balance rocker
44 0 021 X	Crank for 44 0 019 D

163


A
44 0 021 X
44 0 019 D

164



129 - FIGURE 165

Adjusting angularly the subtraction arm.

a) Raise the rear side of the bridge 44 6 026 N *and push forward the division connecting-rod* 44 6 334 X.

b) Lower the current control arm 44 6 006 T *thus removing the interference of the bridge* 44 6 004 Z.

Still push forward the division connecting-rod 44 6 334 X *until it stops against the extension* **K** *of the crank* 44 6 007 U.

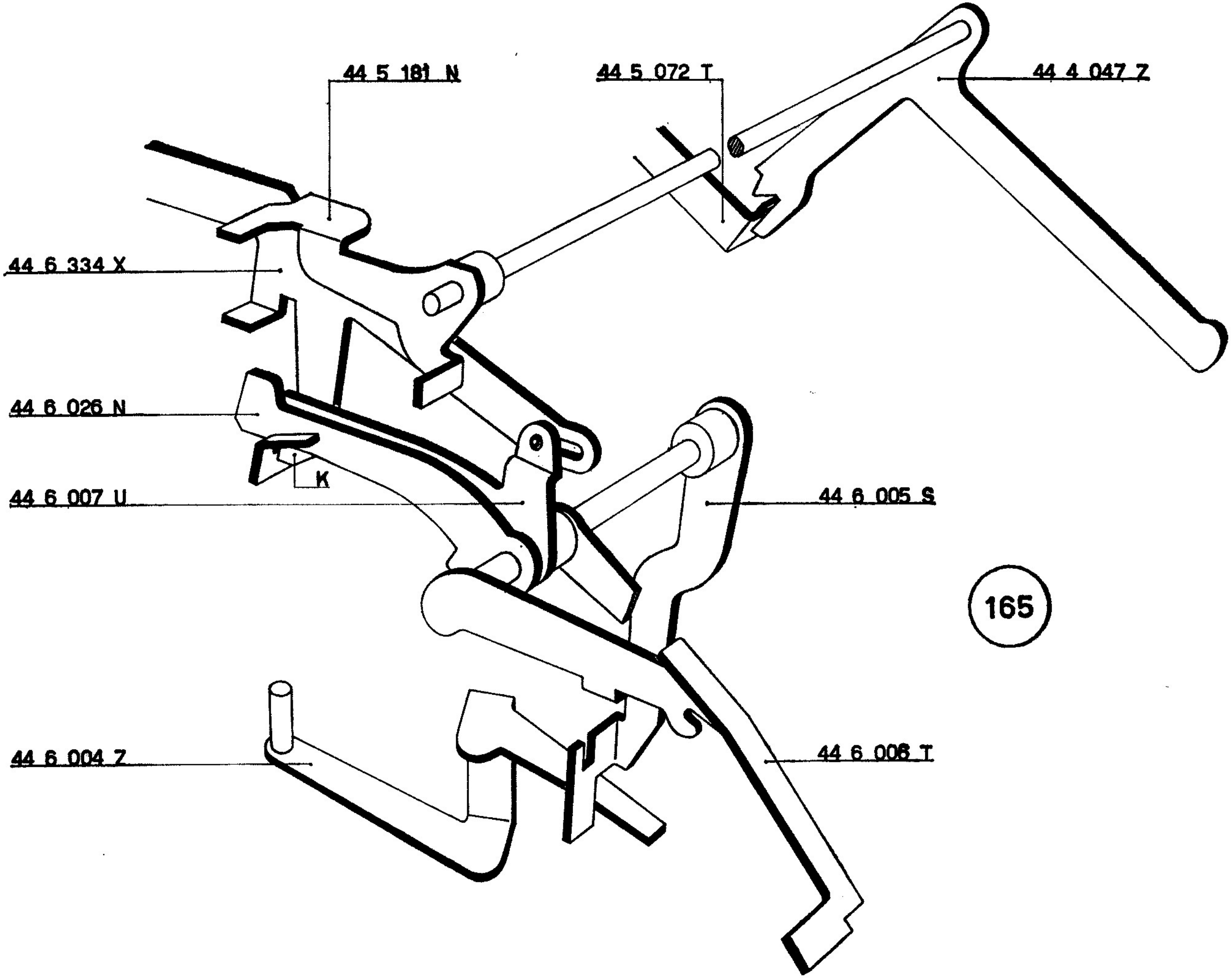
c) Rotate the arm 44 4 047 Z *until it stops against the selector* 44 5 072 T, *as illustrated in the figure. Rotate the main shaft of the machine by about* 90°.

d) Move angularly the subtraction arm 44 5 181 U *until it contacts slightly the division connecting-rod skid* 44 6 334 X. *The axial position of the arm must be adjust so that it skims the external side-plate of the machine.*

Tighten the screw of the arm.

e) Push the division connecting-rod rearward and move the main shaft of the machine back to rest.

44 4 047 Z	Shaft for the second register subtraction control right arm
44 5 072 T	Second register subtraction control selector
44 5 181 N	Subtraction arm
44 6 004 Z	Current release bridge
44 6 005 S	Current control intercepted arm
44 6 006 T	Current control arm
44 6 007 U	Division connecting-rod stop crank (current control)
44 6 026 N	Division connecting-rod release bridge
44 6 334 X	Division connecting-rod with stop pawl


44 5 181 N
44 5 072 T
44 4 047 Z
44 6 334 X
44 6 026 N
K
44 6 007 U
44 6 005 S
44 6 004 Z
44 6 008 T

165

130 - FIGURE 166

Adjusting the credit balance slider stabilizer.

a) Move the machine to rest.

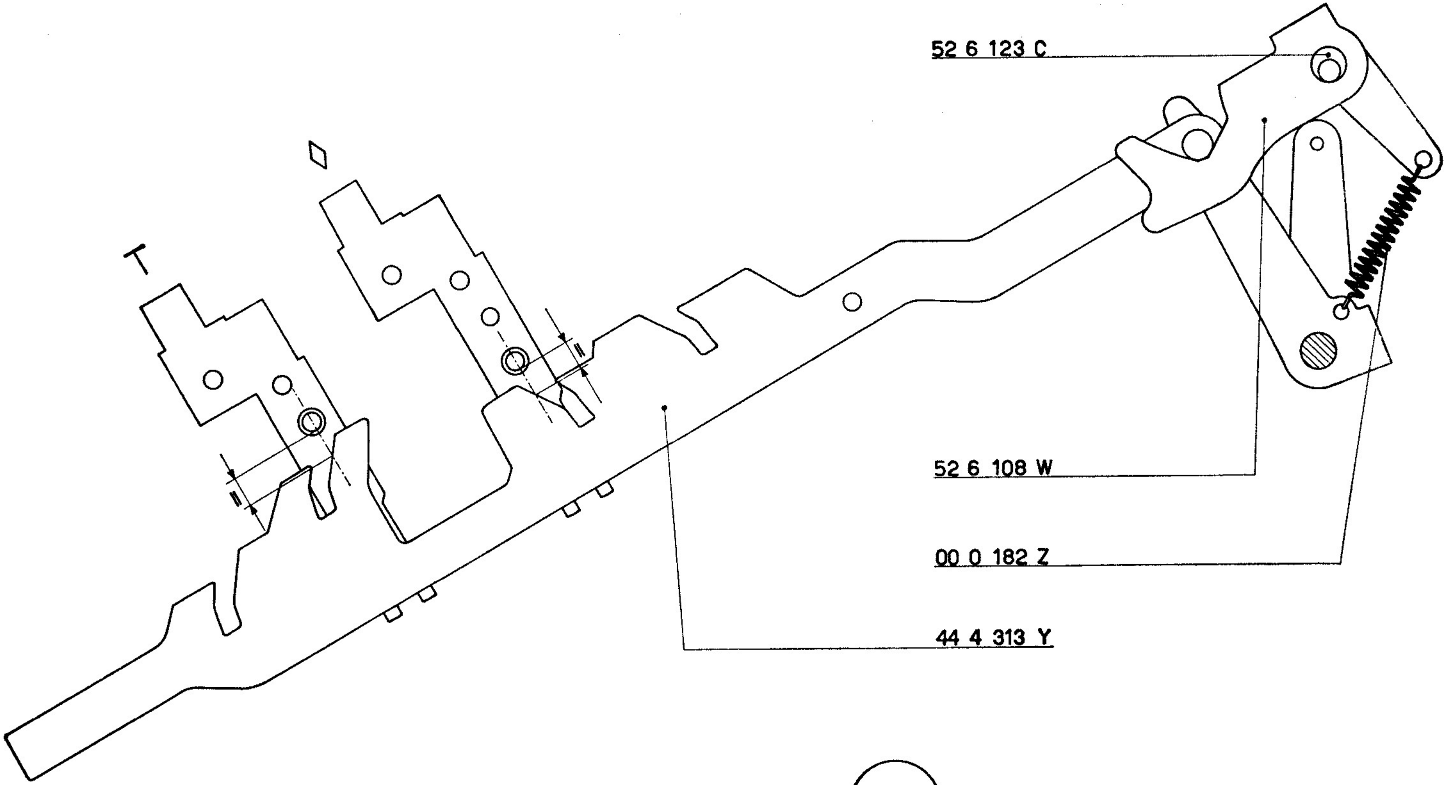
b) Rotate the eccentric 52 6 123 C *so that its full eccentricity is turned upward.*

c) In these conditions:

— depress the second register total key-stem
— depress the first register subtotal key-stem

and check that they make the same travel before their proper pivots reach the proper skids of the slider 44 4 313 Y. *Correct if necessary any possible differences by varying the position of the eccentric* 52 6 123 C.

44 4 313 Y	Credit balance slider
00 0 182 Z	Spring for 52 6 108 W - 44 4 313 Y
52 6 108 W	Credit balance slider stabilizer
52 6 123 C	Eccentric stud-screw for 52 6 108 W


52 6 123 C
T
52 6 108 W
00 0 182 Z
44 4 313 Y

166

131 - FIGURE 167

Adjusting the total inversion control right and left arms.

a) Move the main shaft of the machine to rest.

b) Move the roller **R** *of the arm* 44 4 416 Q *to contact the bottom upper slot of the control plate* 44 4 105 Z.

Adjust the angular position of the arm 44 4 098 V *so that its upper bent is at* 0.5÷0.8 *mm. from the register inversion control plate* 44 4 113 Q.

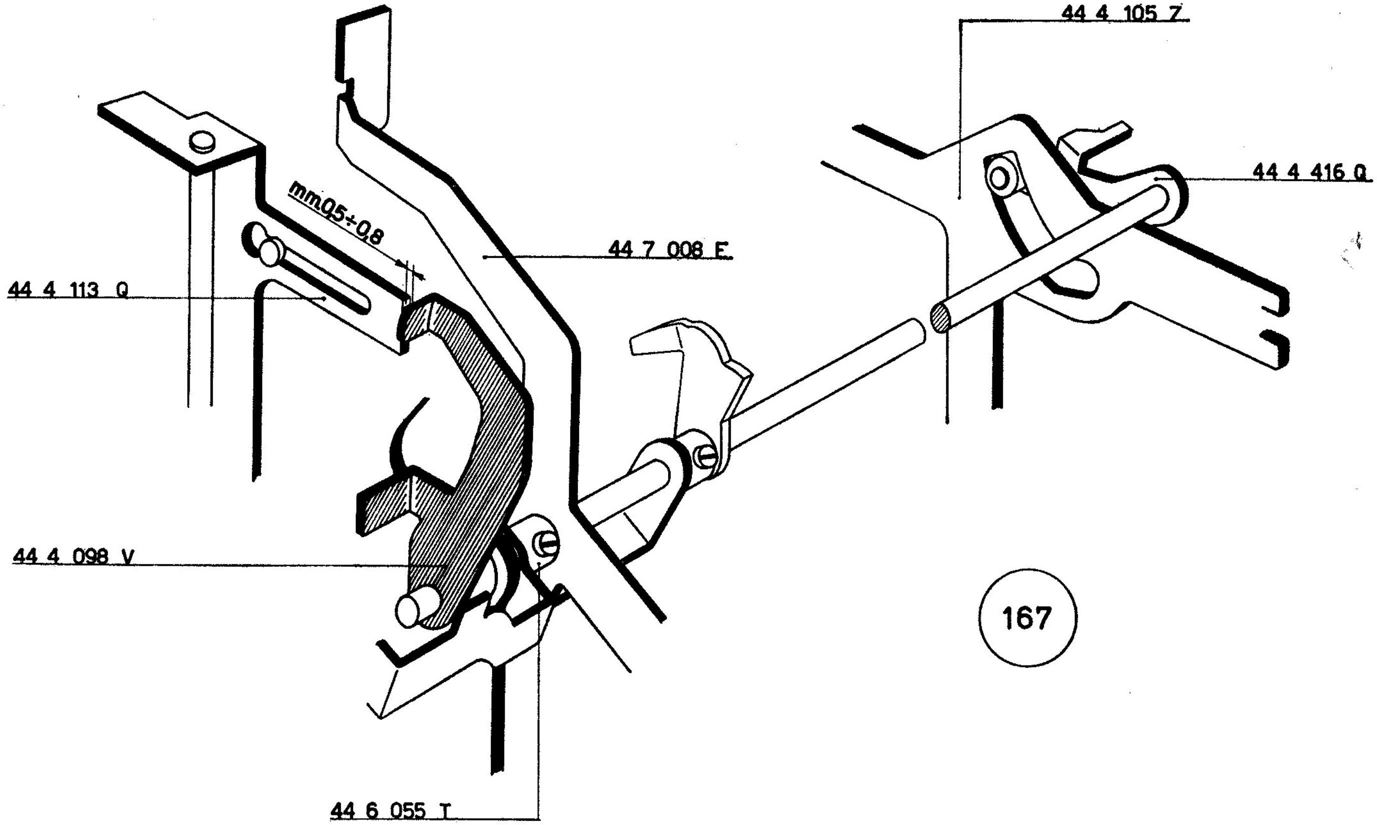
Tighten the screw of the arm 44 4 098 W.

c) Depress a total key and move the control plate 44 4 105 Z *rearward.*

The arm 44 4 098 V *will move the plate* 44 4 113 Q *rearward; check that this latter can still make a short travel.*

Check again if necessary the adjustment described at point b).

44 4 098 V	Total inversion control left arm
44 4 105 Z	Control plate
44 4 113 Q	Registers inversion control plate
44 4 416 Q	Shaft for total inversion control right arm
44 6 055 T	Special hub for 44 6 029 Z
44 7 008 E	Date lever


44 4 105 Z
44 4 416 Q
mm0,5÷0,8
44 7 008 E
44 4 113 Q
44 4 098 V
44 6 055 T
167

132 - FIGURES 168 - 169 - 170

Adjusting the totals and calculation sliders control crank.

a) Move the main cam of the machine to rest.

b) Move axially the crank 44 4 121 Q *so that its two extensions are centered with respect to the two sliders* 44 4 014 Q *and* 44 4 015 R *(figure* 168).

c) Depress the second register total key and push the control plate 44 4 105 Z *rearward. We should obtain the reading shown in the figure* 169.

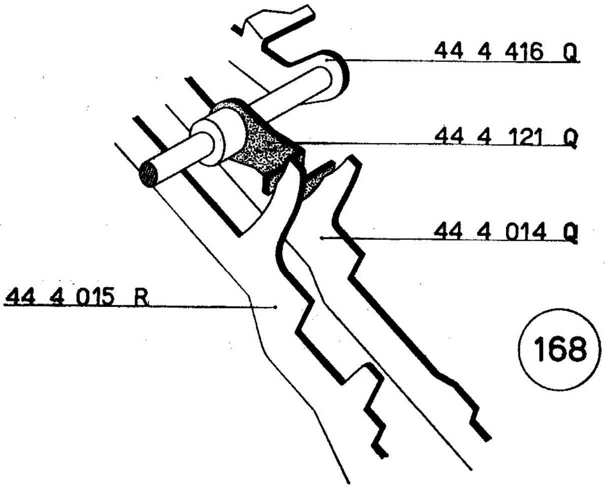
Move the main shaft back to rest.

d) Depress the first register total key and push the control plate 44 4 105 Z *rearward. We should obtain the reading shown in the figure* 170.

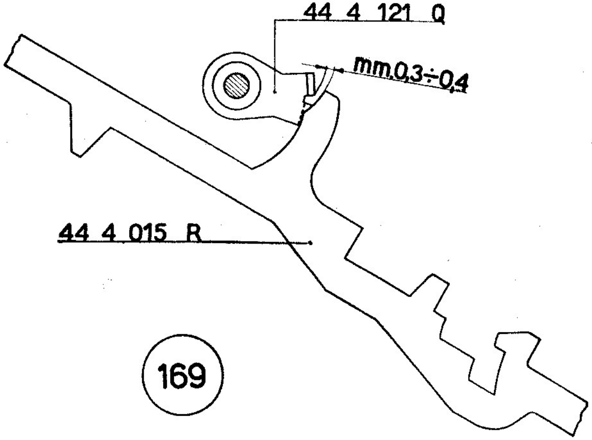
Move the main shaft back to rest.

e) The prescribed conditions are obtained by adjusting suitably the angular position of the crank 44 4 121 Q.

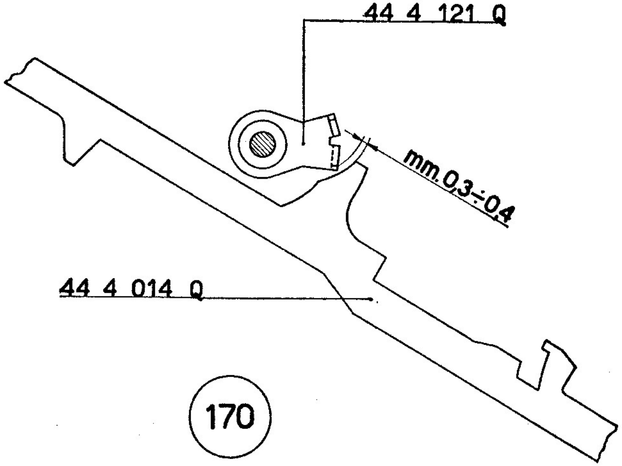
44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and calculation slider
44 4 121 Q	Totals and calculation sliders control crank
44 4 416 Q	Shaft for total inversion control right arm


44 4 416 Q
44 4 121 Q
44 4 014 Q
44 4 015 R

168


44 4 121 Q
mm.0,3÷0,4
44 4 015 R

169


44 4 121 Q
mm.0,3÷0,4
44 4 014 Q

170

133 - FIGURES 171 and 172

Adjusting the rest position of the slider 44 4 014 Q.

a) With the machine at rest check the clearance between the extension of the bridge 44 4 101 V *and the lug of the slider* 44 4 014 Q *(figure* 171).

b) Lower the bridge 44 4 101 V *and check that there is the same clearance between the same extension and the slide stop (figure* 172).

c) Act if necessary the adjustment described at paragraph 132.

44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and calculation slider
44 4 101 V	First register calculation slider stop bridge

134 - FIGURES 173 and 174

Adjusting the rest position of the slider 44 4 015 R.

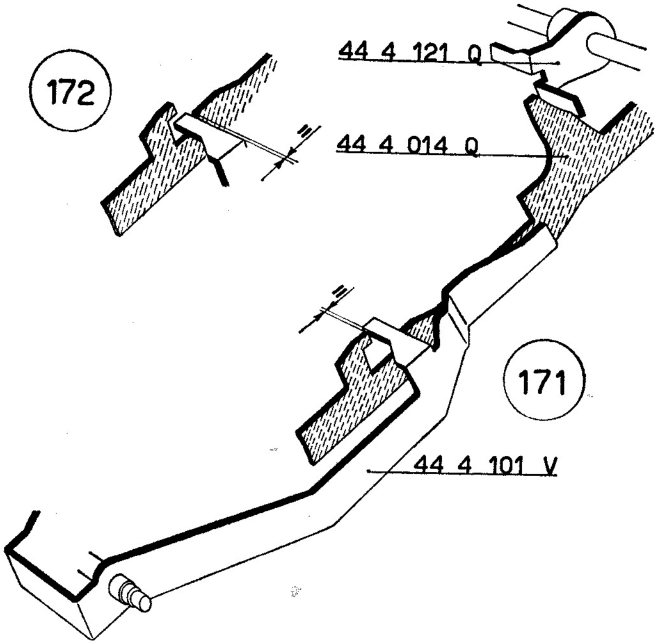
a) With the machine at rest check the clearance between the rear extension of the arm 44 4 102 W *and the slider* 44 4 015 R *(figure* 173).

b) Lower the arm 44 4 102 W *and check that there is the same clearance between the same extension and the slider stop (figure* 174).

c) Act if necessary on the wing of the crank 44 4 121 Q *which stabilizes the slider* 44 4 015 R.

Check the adjustment described at paragraph 132.

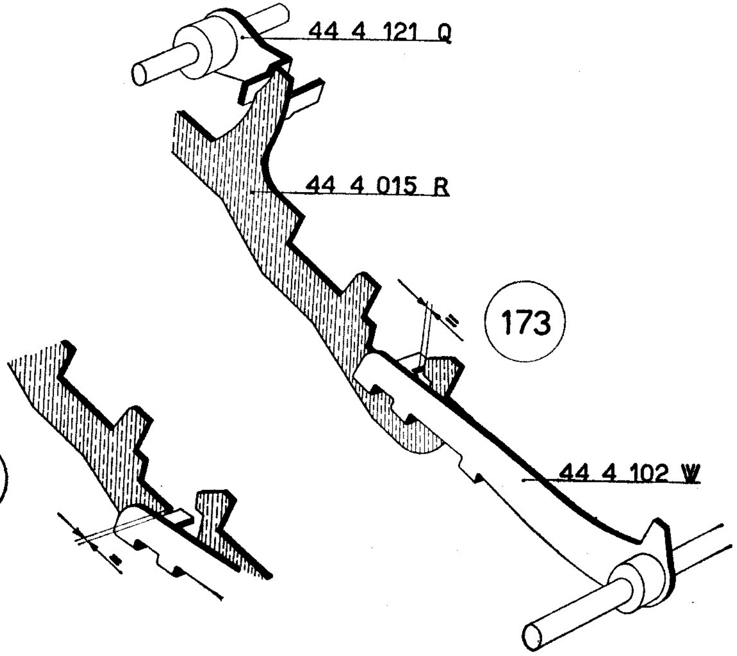
44 4 102 W	Second register calculation slider stop arm
44 4 121 Q	Total calculation sliders control crank



172

171

44 4 121 Q
44 4 014 Q
44 4 101 V



173

174

44 4 121 Q
44 4 015 R
44 4 102 W

135 - FIGURES 175 - 176 - 177 - 178 - 179 - 180

Adjusting the position of the second register engagement control bridge.

a) Reduce the lateral play of the bridge 44 4 092 P *(in the direction shown by the two arrows) and check that the cylindric part of the pivot* **P** *is always engaged with the extensions of the plate* 52 1 196 H.

Check also that the cylindric part of the pivot **P1** *is at its turn always engaged with the extensions of the plate* 52 1 194 F.

Act if necessary on the 44 4 692 V.

b) Make the following checkings;

— *depress the second register add key and rotate the main shaft by about* 90°. *Check that the pivot* **P** *is completely covered by the proper extension of the plate* 52 1 196 H *(figure* 176).

Move the main shaft back to rest.

— *depress the second register subtraction key and rotate the main shaft by about* 90°. *Check that the pivot* **P** *is completely covered by the same extension of the plate* 52 1 196 H *(figure* 177).

Move the main shaft back to rest.

— *depress the second register subtotal key and push the control plate* 44 4 105 Z *rearward.*

Check that the pivot **P** *is centered with respect to the upper extension of the plate* 52 1 196 H *(figure* 178).

Rotate the main shaft by about 180° *and check that the pivot* **P1** *has a little clearance* **L** *with respect to the upper extension of the plate* 52 1 194 F *(figure* 179).

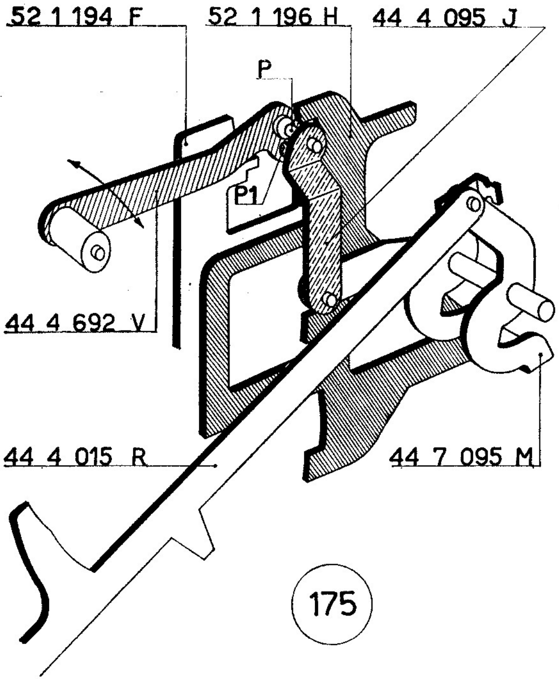
Move the main shaft back to rest.

— *depress the first register total key. Push the control plate* 44 4 105 Z *rearward and rotate the main shaft by few degrees. Between the upper extension of the plate* 52 1 196 H *and the pivot* **P** *there should still be a little clearance* **L** *(figure* 180).

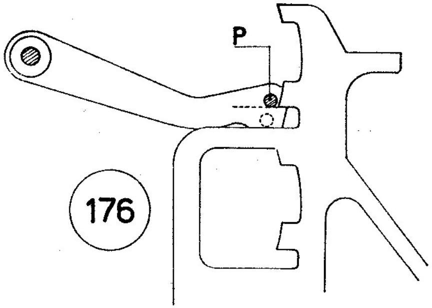
Move the main shaft back to rest.

During all these tests it may happen that the pivot **P** *is always higher of lower than the described positions. In this case modify the vertical position of the bridge* 44 4 692 V *(figure* 175) *by acting suitably on the two arms of the bridge* 44 7 095 M.

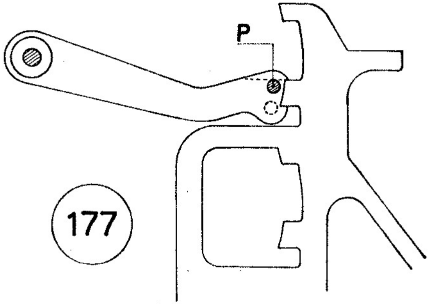
44 4 015 R	Second register total and calculation slider
44 4 095 J	Small connecting-rod
44 4 692 V	Registers engagement and disengagement frame control bridge
44 7 095 M	Second register special signs and engagement selector bridge
52 1 194 F	Plate controlling the engagement of the registers with the transmissions unit
52 1 196 H	Plate controlling the engagement of the registers with the racks


52 1 194 F
52 1 196 H
44 4 095 J
P
P1
44 4 692 V
44 4 015 R
44 7 095 M

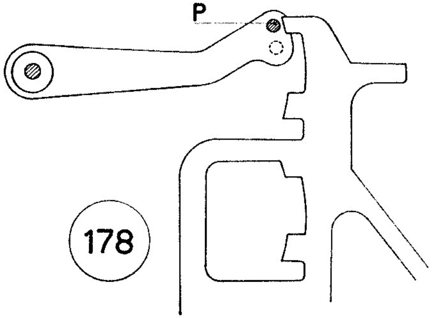
175



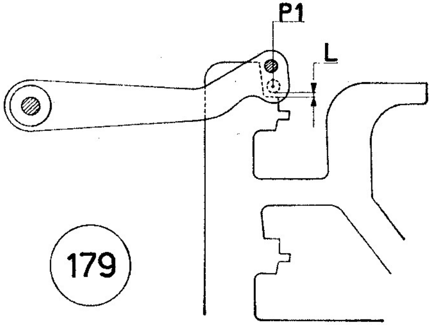
176



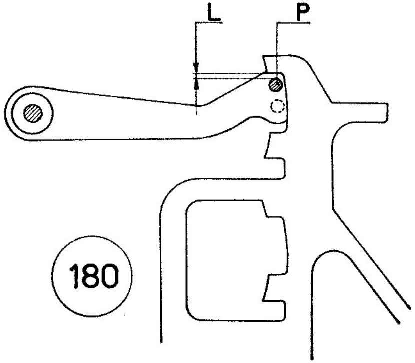
177



178



179



180

136 - FIGURES 181 - 182 - 183 - 184 - 185 - 186

Adjusting the position of the first register engagement control bridge.

a) Reduce the lateral play of the bridge 44 4 692 V *(in the direction of the two arrows) and check that the cylindric part of the pivot* **P** *is always engaged with the extensions of the plate* 52 1 196 H. *Check also that the cylindric part of the pivot* **P1** *is at its turn always engaged with the extensions of the plate* 52 1 194 F. *Act if necessary on the same* 44 4 692 V.

b) Make the following checkings:

— depress the first register add key and rotate the main shaft by about 90°. *Check that the pivot* **P** *is completely covered by the proper extension of the plate* 52 1 196 H *(figure* 182).

Move the main shaft to rest.

— depress the first register subtraction key and rotate the main shaft by about 90°. *Check that the pivot* **P** *is completely covered by the same extension of the plate* 52 1 196 H *(figure* 183).

Move the main shaft back to rest.

— depress the first register subtotal key and push the control plate 44 4 105 Z *rearward. Check that the pivot* **P** *is centered with respect to the upper extensions of the plate* 52 1 196 H *(figure* 184). *Rotate the main shaft by about* 180° *and check that the pivot* **P1** *has a little clearance* **L** *with respect to the extension of the plate* 52 1 194 F *(figure* 185).

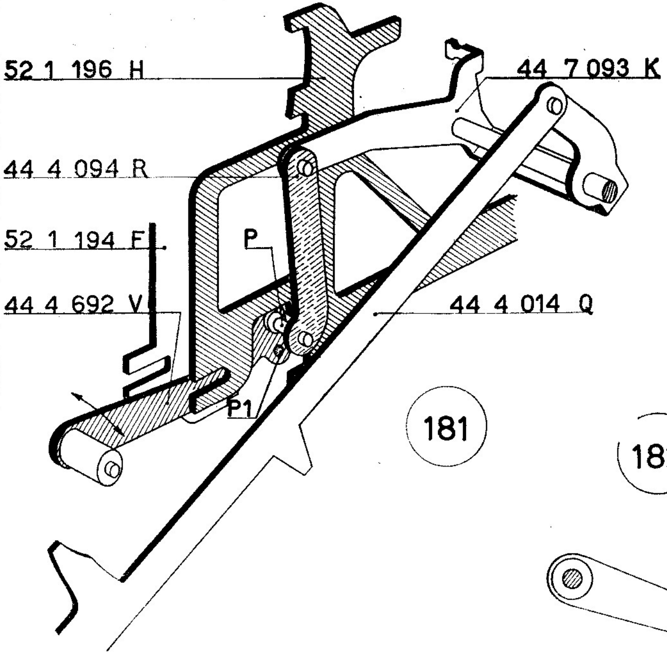
Move the main shaft back to rest.

— depress the second register total key. Push the control plate 44 4 105 Z *rearward and rotate the main shaft by few degrees. Between the upper extension of the plate* 52 1 196 H *and the pivot* **P** *there should still be a little clearance* **L** *(figure* 186).

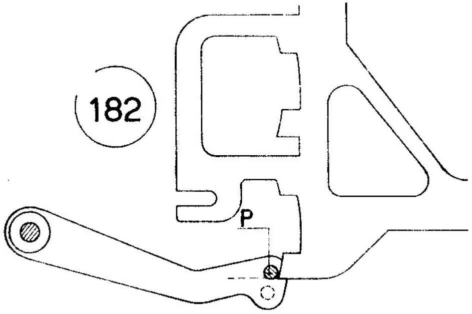
Move the main shaft back to rest.

During all these tests it may happen that the pivot **P** *is always higher or lower than the described position. In this case modify the vertical position of the bridge* 44 4 692 V *by acting suitably on the two arms of the bridge* 44 7 093 K *(figure* 181).

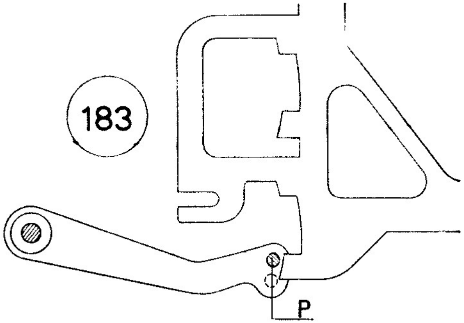
44 4 014 Q	First register total and calculation slider
44 4 094 R	Small connecting-rod
44 4 692 V	Registers engagement and disengagement frames control bridge
44 7 093 K	First register special signs and engagement selector bridge
52 1 194 F	Plate controlling the engagement of the register with the transmissions unit
52 1 196 H	Plate controlling the engagement of the register with the racks


52 1 196 H
44 7 093 K
44 4 094 R
52 1 194 F
P
44 4 692 V
44 4 014 Q
P1

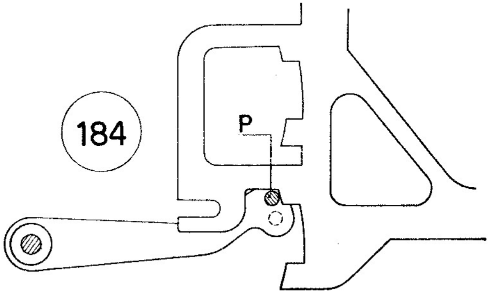
181



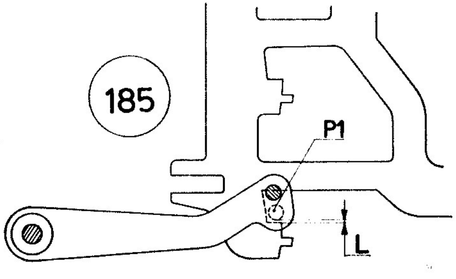
182



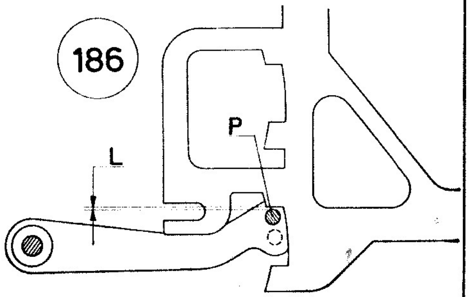
183



184



185



186

137 - FIGURES 187 and 188

Adjusting the front add key control.

a) Move the machine to rest.

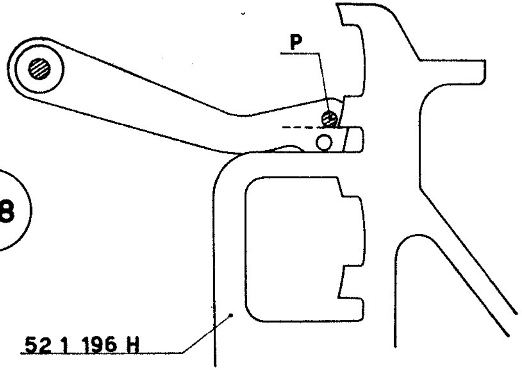
b) Depress the front add key and rotate the main shaft by about 90° so that the slider 44 4 015 R *comes resting on the wing* **A** *of the transmission lever* 44 4 346 H *(figure* 187).

c) In this position we should have the condition illustrated in the figure 188 *that is, the pivot* **P** *should be completely covered by the extension of the plate* 52 1 196 H.

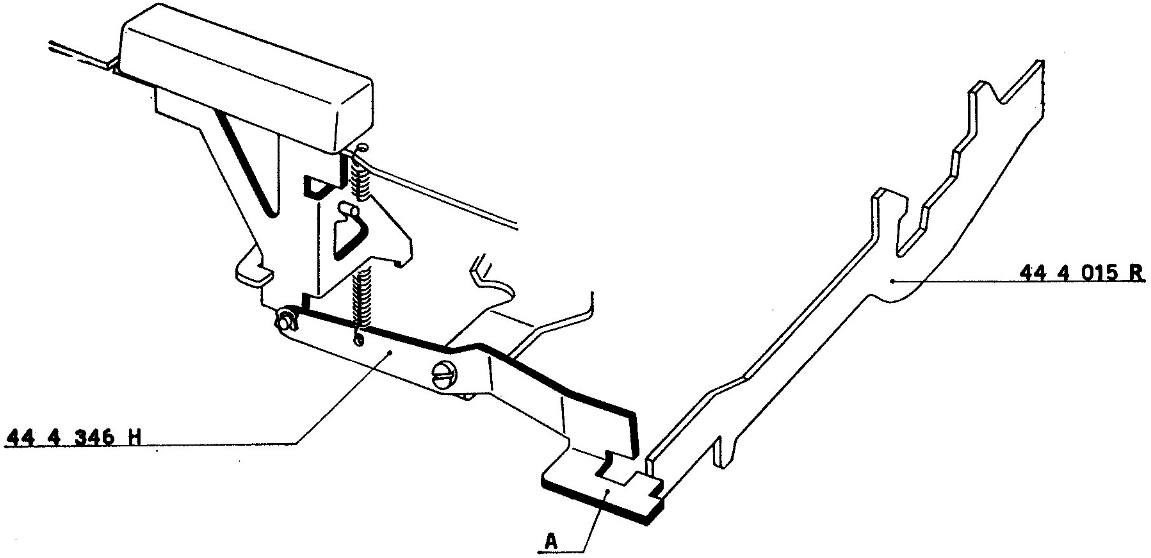
The same condition has already been obtained by depressing the second register add key (see the figure 176).

44 4 015 R	Second register total and calculation slider
44 4 346 H	Front add key transmission lever
52 1 196 H	Plate controlling the engagement of the registers with the racks

188



187


44 4 346 H
A
44 4 015 R

138 - FIGURES 189 and 190

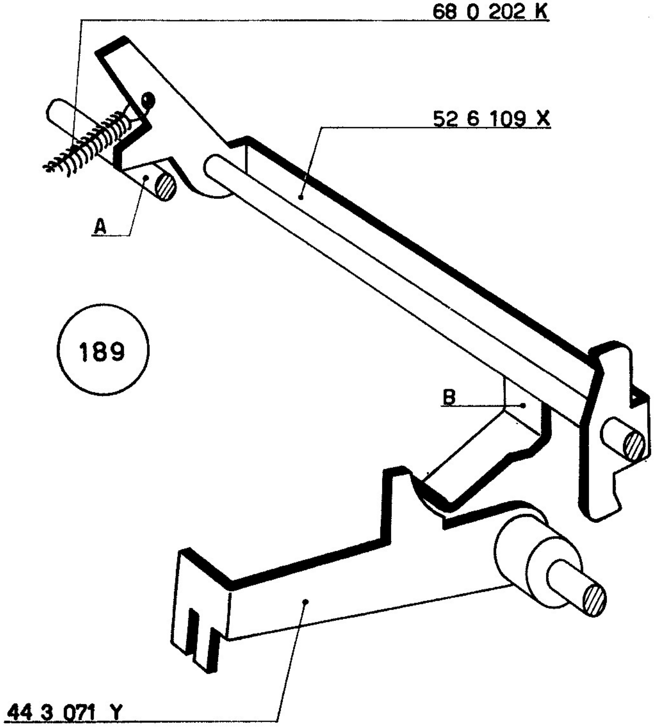
Adjusting the rest position of the credit balance transfer bridge.

a) Move the main shaft of the machine to rest.

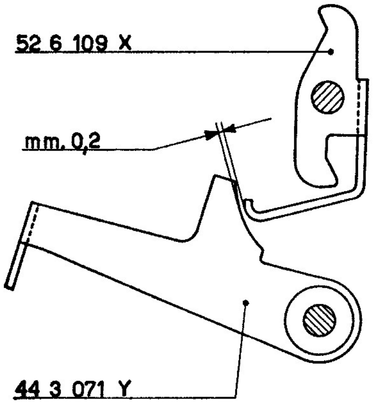
b) With the bridge 52 6 109 X *resting on the shaft* **A** *(figure* 189), *we should obtain the clearance of* 0.2 *mm. shown in the figure* 190.

Act if necessary on the extension **B** *of the same bridge.*

44 3 071 Y	First register credit balance rocker control crank
52 6 109 X	Credit balance transfer bridge
68 0 202 K	Spring for 52 6 109 X


68 0 202 K
52 6 109 X
A
B
44 3 071 Y

189


52 6 109 X
mm. 0,2
44 3 071 Y

190

139 - FIGURE 191

Adjusting the credit balance control bridge.

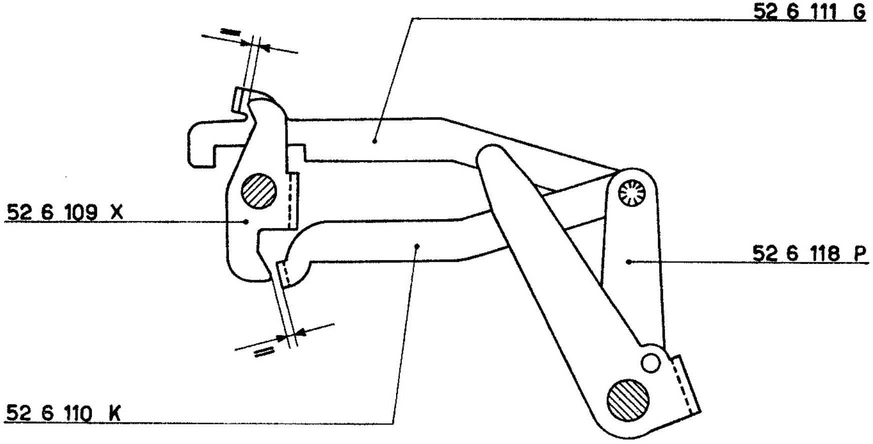
a) Move the main shaft of the machine to rest.

b) Between the front extensions of the stays 52 6 110 K *and* 52 6 111 G *and the bridge* 52 6 109 X *there should be the same clearance.*

Act if necessary on the bridge 52 6 118 P.

52 6 109 X	Credit balance transfer bridge
52 6 110 K	First register subtraction control stay
52 6 111 G	Second register subtraction control stay
52 6 118 P	Credit balance control bridge

191


52 6 111 G
52 6 109 X
52 6 118 P
52 6 110 K
=
=

140 - FIGURES 192 and 193

Adjusting the control travel during the first register credit balance.

a) Clear the first register.

b) Enter a figure and input it negatively in the first register.

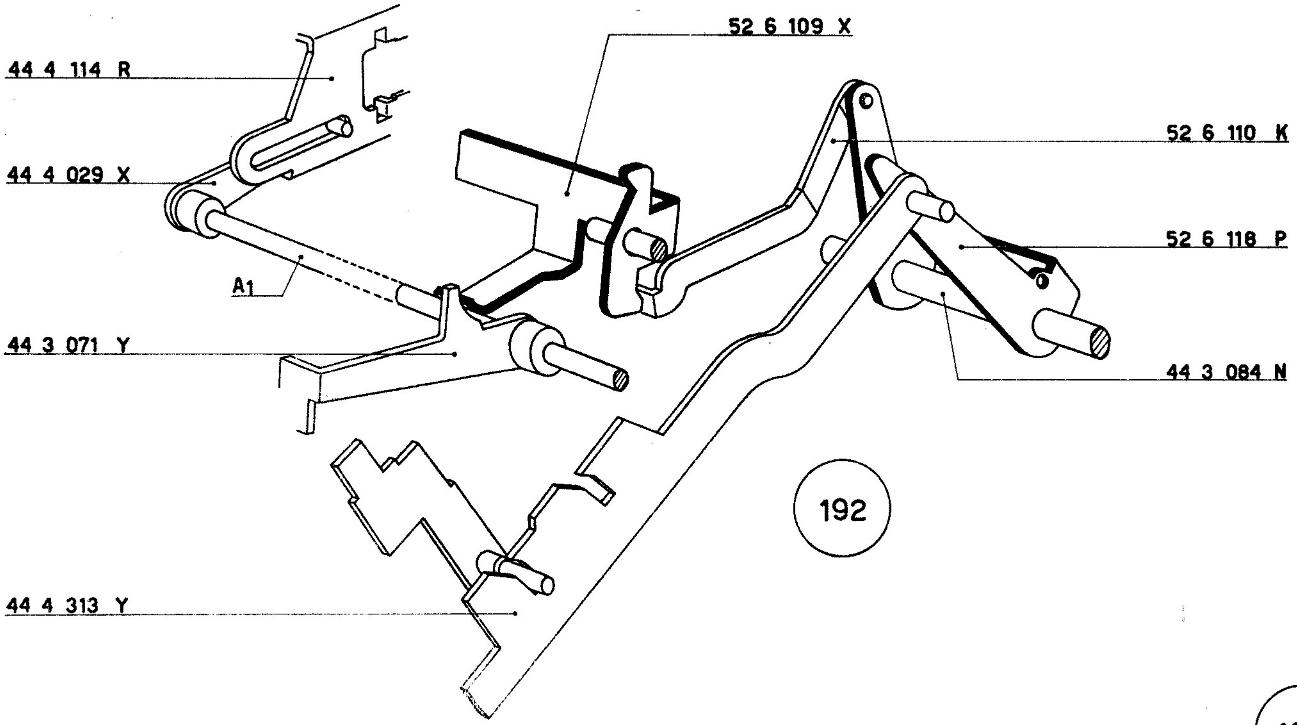
c) Depress a first register total key; the slider 44 4 313 Y *rotates the bridge* 52 6 118 P *which pushes the stay* 52 6 110 K *forward. This latter rotates the bridge* 52 6 109 X *which, by means of its extension, lowers the crank* 44 3 071 Y *integral with the shaft* **A1**. *The shaft* **A1** *causes the rotation of the crank* 44 4 029 X *and consequently the raising of the plate* 44 4 114 R.

d) Rotate the main shaft by about 170° *and check the condition illustrated in the figure* 193.

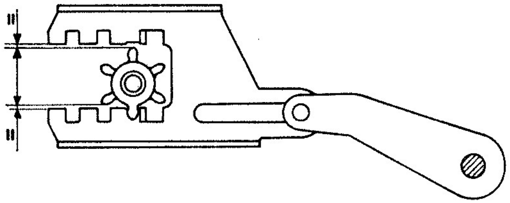
N.B. — The above checking as well as that described at paragraph 141 *should be both done before retouching the precedent adjustments.*

Please see at paragraph 141 *the instructions to obtain what is requested.*

44 3 071 Y	First register credit balance control crank
44 3 084 N	Shaft for bridge 52 6 118 P
44 4 029 X	Subtraction control left arm
44 4 114 R	Register inversion plate
44 4 313 Y	Credit balance slider
52 6 109 X	Credit balance transfer bridge
52 6 110 K	First register subtraction control stay
52 6 118 P	Credit balance bridge


44 4 114 R
44 4 029 X
A1
44 3 071 Y
44 4 313 Y
52 6 109 X
52 6 110 K
52 6 118 P
44 3 084 N

192


II
II

193

141 - FIGURES 194 and 195

Adjusting the control travel during second register credit balance.

a) Clear the second register.

b) Enter a figure and input it negatively in the second register.

c) Depress a second register total key; the slider 44 4 313 Y *rotates the bridge* 52 6 118 P *which drags the lever* 52 6 111 G *reaward. This latter*:

— *rotates the bridge* 52 6 109 X *which, through its extensions, lowers the crank* 44 3 071 Y *integral with the shaft* **A1**

— *rotates the crank* 52 6 114 E *integral with the shaft* **A.**

d) The rotation of the shaft **A1** *causes the rotation of the crank* 44 4 029 X *which presets the inversion of the first register.*

The rotation of the shaft **A** *causes the rotation of the crank* 44 4 029 X *which presets the inversion of the second register.*

e) Rotate the main shaft by about 170° *and check that for both registers there is the condition illustrated in the figure* 195.

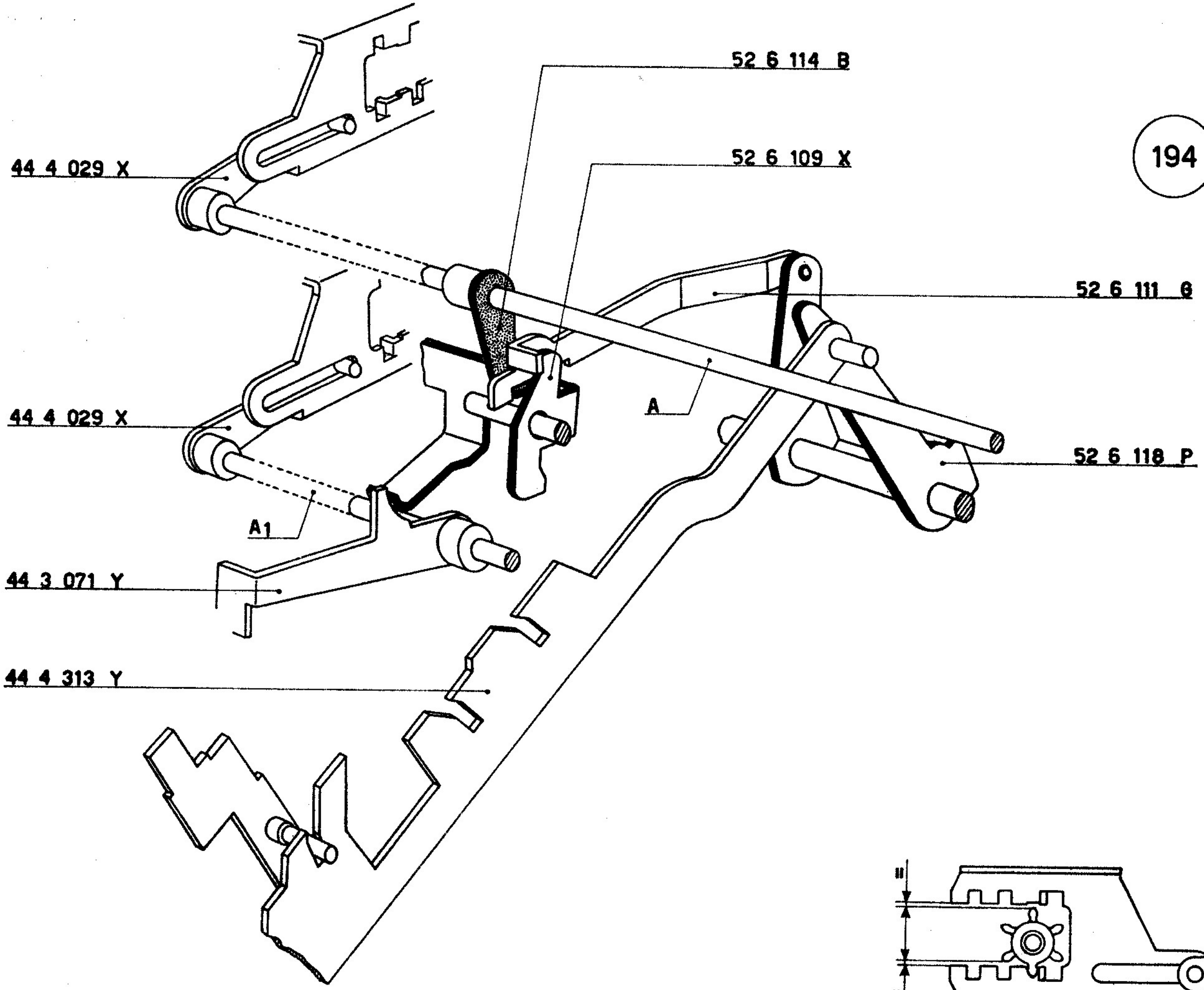
f) This is obtained:

— *for the second register*: *by adjusting the angular position of the crank* 52 6 114 D

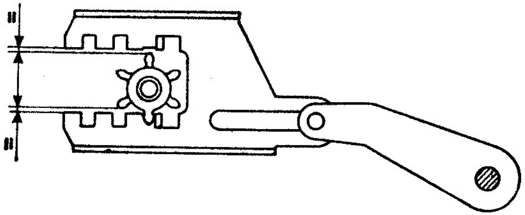
— *for the first register*: *and for the checking made at paragraph* 140: *by checking again the adjustments described at paragraphs* 139, 138, 130.

44 3 071 Y	First register credit balance rocker control crank
44 4 029 X	Subtraction control left arm
44 4 313 Y	Credit balance slider
52 6 109 X	Credit balance transfer bridge
52 6 111 G	First register subtraction control stay
52 6 114 B	Second register subtraction control crank
52 6 118 P	Credit balance control bridge

194


52 6 114 B
52 6 109 X
44 4 029 X
52 6 111 G
A
44 4 029 X
52 6 118 P
A1
44 3 071 Y
44 4 313 Y

195


II
II

142 - FIGURES 196 - 197 - 198

Assembling the column indicator.

a) Insert the shaft of the column indicator 43 1 018 P (or 43 1 019 Q) in the appropriate guide hole of the support 52 6 059 X.

Place the toothed wheel 43 1 022 B on the shaft.

b) Place this unit on the machine; the shaft of the column indicator should be inserted in the guide hole of the support 43 1 017 E.

The extension of the bridge 44 1 644 M must be inserted in the guide slot made in the support 52 6 059 X (figure 197).

c) Secure the support 52 6 059 X:

— at the left: by means of the pivot 44 7 063 U with the nut 938 3 05 G. The pivot should be screwed until it is straight-lined with the internal side-plate of the machine.

— at the right: by means of a screw 925 3 22 K and of the column 44 7 127 R.

d) On the shaft of the indicator drum place the spring-clip 945 2 51 G.

Adjust the axial position of the toothed whell 43 1 022 B *leaving a little play to the shaft.*

Tighten but not right home one screw of the toothed wheel.

e) By moving suitably the support 52 6 059 X *center the numbers of the indicator in the window.*

Tighten the screws and the pivots securing the support.

f) Between the support 52 6 059 X and the bridge 44 5 386 T, hook the spring 40 7 110 V (figure 196).

g) Between the support 52 6 059 X and the special sector of the transmissions upper unit, hook the spring 40 8 152 C (figure 198).

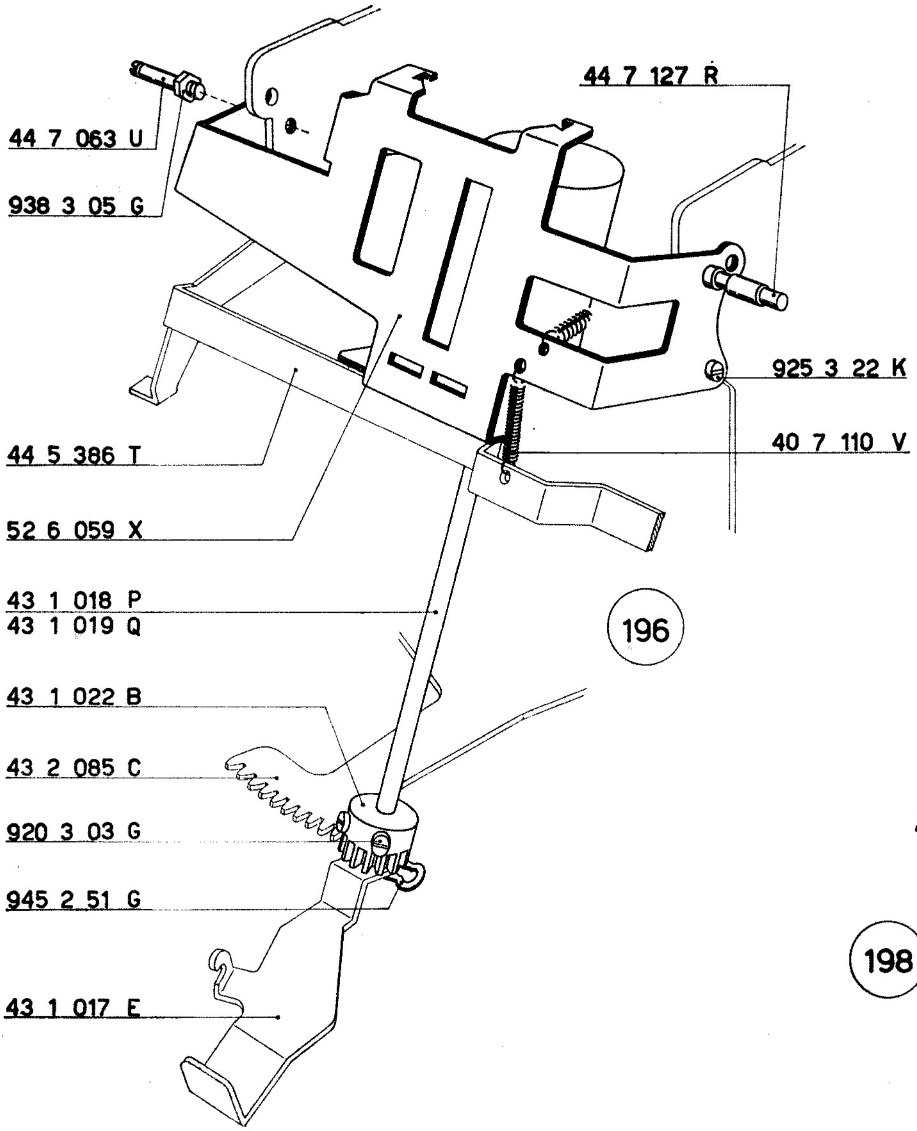
143 - Adjusting the slide transmissions lever with respect to the column indicator drum.

By rotating suitably the indicator drum with respect to the toothed wheel 43 1 022 B *adjust the position of the drum.*

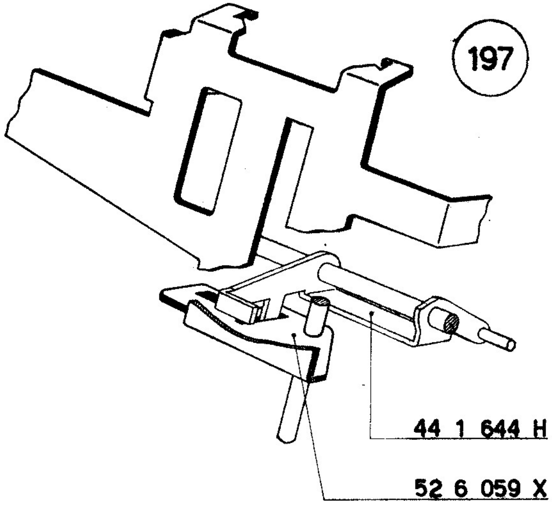
Tighten the two screws of the toothed wheel.

44 1 644 H	First register credit balance indicator bridge
44 5 386 T	First register slider stop (cubic calculation) control bridge
44 7 063 U	Special spring-holder
44 7 127 R	Special column
40 7 110 V	Spring for 44 5 386 T
40 8 152 C	Spring for transmissions upper unit special sector
43 1 017 E	Column indicator drum support

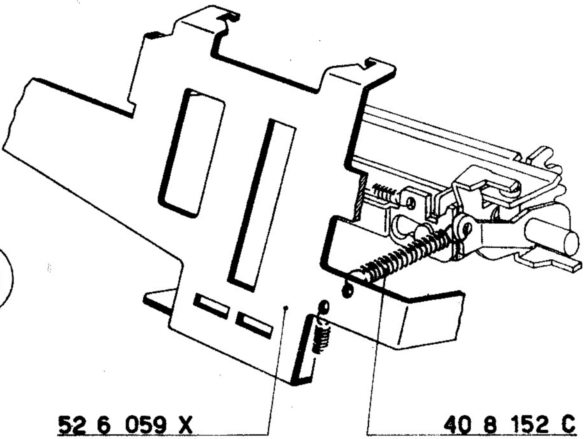
43 1 018 P	Column indicator drum (N)
43 1 019 Q	Column indicator drum (K)
43 1 022 B	Column indicator drum toothed wheel
43 2 085 C	Slide transmission lever
52 6 059 X	Indicator drum support
920 3 03 G	Screw for 43 1 022 B
925 3 22 K	Securing screw for indicator drum support
938 3 05 G	Nut for 44 7 063 U
945 2 51 G	Spring-clip


44 7 063 U
938 3 05 G
44 7 127 R
925 3 22 K
40 7 110 V
44 5 386 T
52 6 059 X
43 1 018 P
43 1 019 Q
43 1 022 B
43 2 085 C
920 3 03 G
945 2 51 G
43 1 017 E

196


44 1 644 H
52 6 059 X

197


52 6 059 X
40 8 152 C

198

144 - FIGURE 199

Adjusting the second register special signs slider bridge.

a) Depress the « non-add » key and rotate the main shaft until the special signs racks have all made their upward travel.

b) Check the reading shown in the figure; act if necessary on the same bridge 44 7 097 P.

c) Move the main shaft to rest.

44 7 094 L	First register special signs rack
44 7 096 N	First register signs slider control bridge

145 - FIGURE 200

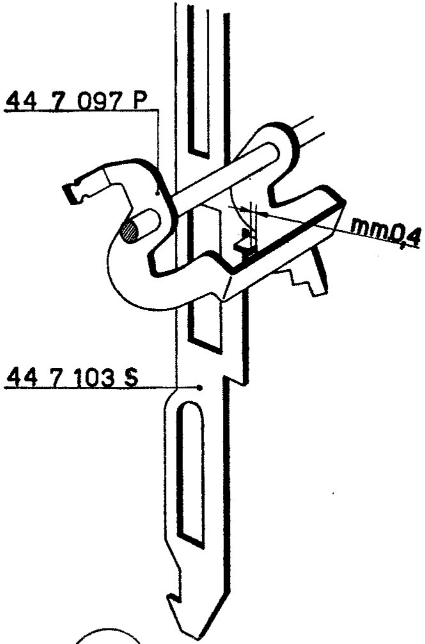
Adjusting the first register special signs slider bridge.

a) Depress the « non-add » key and rotate the main shaft until the special signs rack have all made their upward travel.

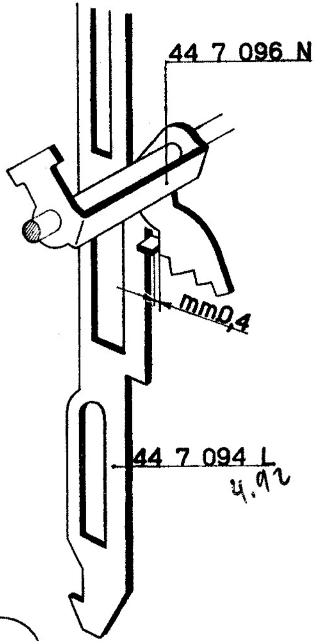
b) Check the reading shown in the figure; act if necessary on the same bridge 44 7 096 N.

c) Move the main shaft to rest.

44 7 097 P	Second register signs slider control bridge
44 7 103 S	Second register special signs rack


44 7 097 P
mm0,4
44 7 103 S

199


44 7 096 N
mm0,4
44 7 094 L

4.92

200

146 - FIGURE 201

Adjusting the position of the slide restoring rod.

a) Enter a series of figures on the keyboard. Depress and add key and rotate the main shaft.

The slide restoring rod 43 2 098 R *should meet with the arm* 44 2 073 Z *on the spot illustrated in the figure. Act if necessary on the bridge* 52 2 027 B *which establishes the position of the bridge* 44 2 028 K *which, through the lever* **L**, *determines at its turn the position of the rod* 43 2 098 R.

b) Move the main shaft back to rest.

147 - Adjusting the slide restoring.

a) Enter a series of figures.

b) Depress an add key and rotate the main shaft.

c) At full restoring the slide should contact slightly the pivot supporting the slide rubber stop. To do this, adjust the position of the pivot 44 2 074 S *assembled on the slide restoring lever* 43 2 085 C *(figure* 44).

148 - FIGURE 202

Adjusting the position of the repeat slider.

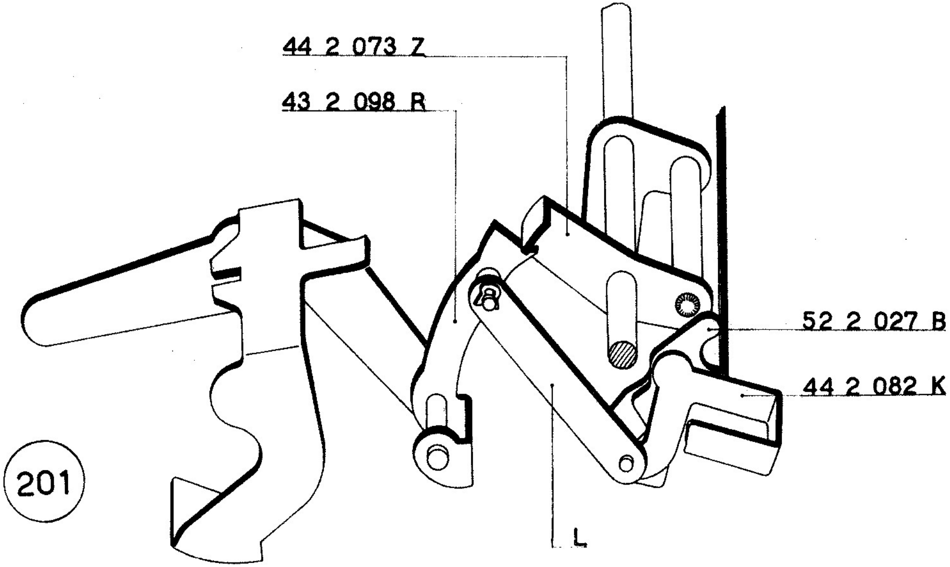
a) Move the main shaft to rest.

b) Check that there is between the repeat key-stem 43 4 016 G *and the slider* 43 4 013 D *the clearance shown in the figure. The same clearance must be seen between the pivot* **P** *of the correction key-stem* 43 4 002 K *and the same slider. To do this, act if necessary on the front bent* **A** *of the plate* 44 4 037 P.

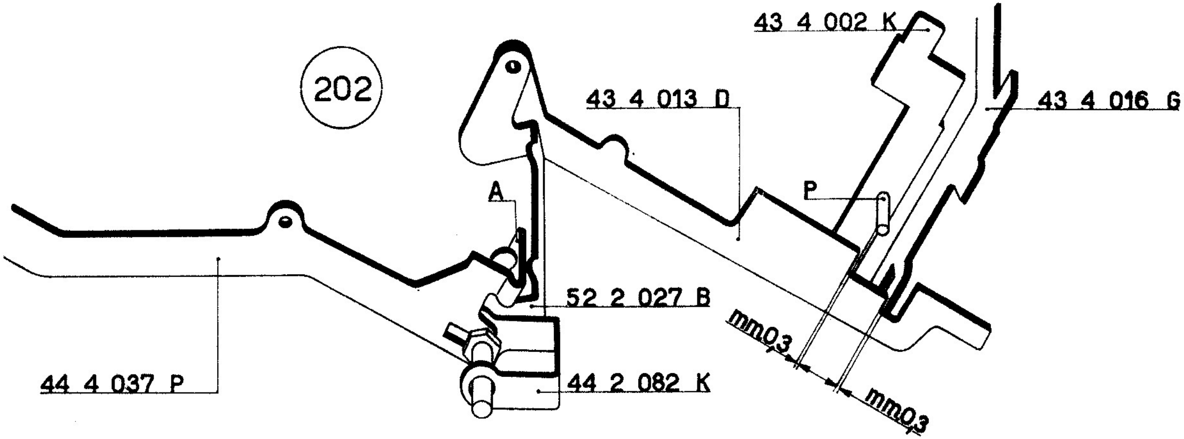
44 2 073 Z	Slide restoring transmission frame left arm
44 2 082 K	Repeat control bridge
44 4 037 P	Printing and repeat restoring plate
43 2 098 R	Slide restoring rod

43 4 002 K	« Back-space » and« clearing » key-stem
43 4 013 D	Repeat slider
43 4 016 G	« Repeat » key-stem
52 2 027 B	Repeat slider transmission bridge

201


44 2 073 Z
43 2 098 R
52 2 027 B
44 2 082 K
L

202


43 4 002 K
43 4 013 D
43 4 016 G
A
P
52 2 027 B
44 4 037 P
44 2 082 K
mm0,3
mm0,3

149 - FIGURES 203 and 204

Adjusting the back-space of the slide.

a) Enter a series of figures.

b) Depress the « back-space » control key and rotate the main shaft.

c) The lever 44 2 364 H *should move the tooth* 43 2 082 H *rightward. This latter transmits the movement to the slide. At maximum restoring hold the stop tooth* 43 2 074 Q *against the right side of the guide slot of the plate* 43 2 075 R *and move the main shaft back to rest. The slide should move leftward and make a travel of* 0.4 *mm. (figure* 203) *before resting on this stop tooth* 43 2 074 Q. *The conditions are obtained by acting on the lever* 44 2 364 H.

d) With the machine at rest, we should have the clearance shown in the figure 204 *which is obtained by acting suitably on the wing* **A** *of the lever* 44 2 064 Y.

150 - FIGURE 205

Adjusting the back-space tooth control lever.

a) Depress the correction control key.

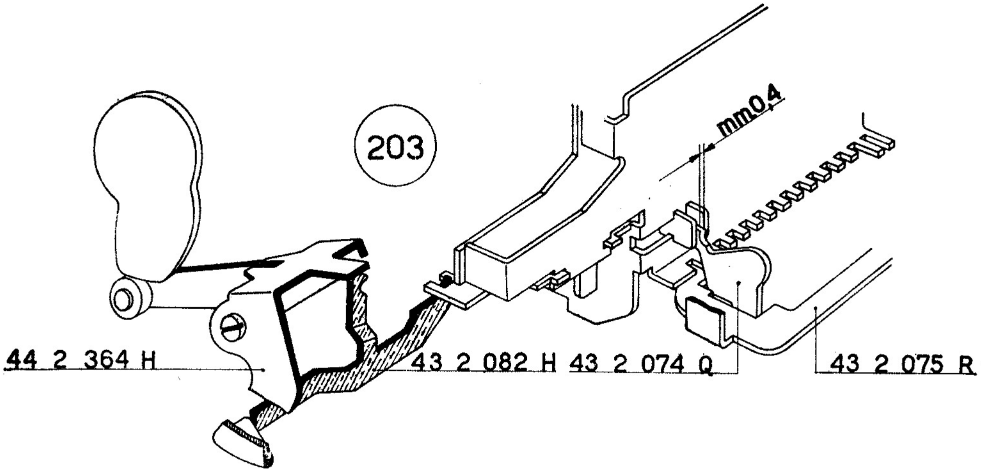
b) Rotate the main shaft.

c) The back-space control lever 43 4 014 E *raises the tooth* 43 2 082 H. *We should obtain the clearance shown in the figure; act if necessary on the lever* 43 4 014 E.

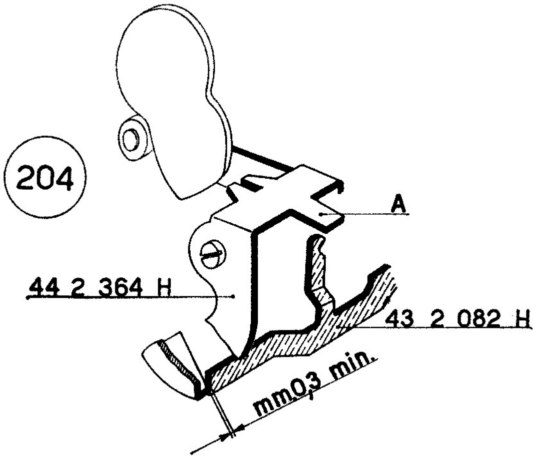
44 2 364 H	Transmission bridge control lever
43 2 074 Q	Slide stop tooth
43 2 075 R	Slide guide and escapement plate

43 2 082 H	Back-space tooth
43 4 014 E	Back-space tooth control lever

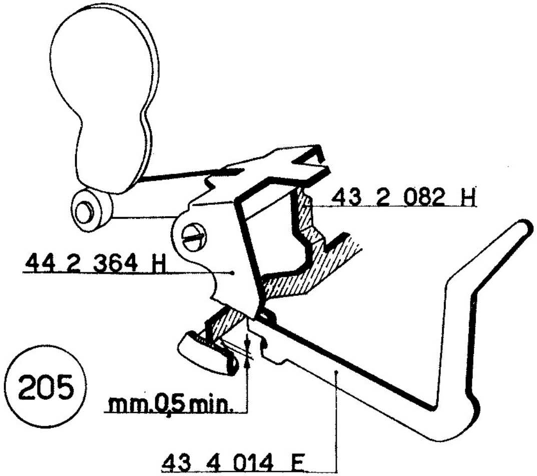
203


mm0,4
44 2 364 H
43 2 082 H
43 2 074 Q
43 2 075 R

204


A
44 2 364 H
43 2 082 H
mm0,3 min.

205


43 2 082 H
44 2 364 H
mm.0,5 min.
43 4 014 E

151 - FIGURE 206

Assembling the crank of the entry control plate frame.

a) In the appropriate guide hole of the left external side-plate insert, correctly orientated, the shaft 44 6 065 V on which should be placed the two cranks 44 5 034 M with the screw 922 3 02 V.

Secure the shaft with a spring-clip 945 2 51 G.

b) *Adjust the axial position of the crank* 44 5 034 M *to leave a little play to the shaft.*

Tighten the screw of this crank.

c) Between the two cranks 44 5 034 M place the shaft 44 5 037 Q on which should be located the entry control plate 44 5 032 K. In the appropriate seat of the shaft 44 5 037 Q set the spring-clip 945 2 51 G.

152 - FIGURE 207

Assembling the shaft 44 5 036 P and the external arm of the entry control plate.

a) Between the two internal side-plates of the machine place, correctly orientated, the shaft 44 5 036 P which should be placed in the slot of the plate 44 5 032 K.

Secure the shaft with two spring-clips 945 2 51 G.

b) On the crank 44 5 034 M (external) assemble the arm of the entry control plate 44 5 033 L securing it with a screw 920 3 02 F which should not be tightened right home.

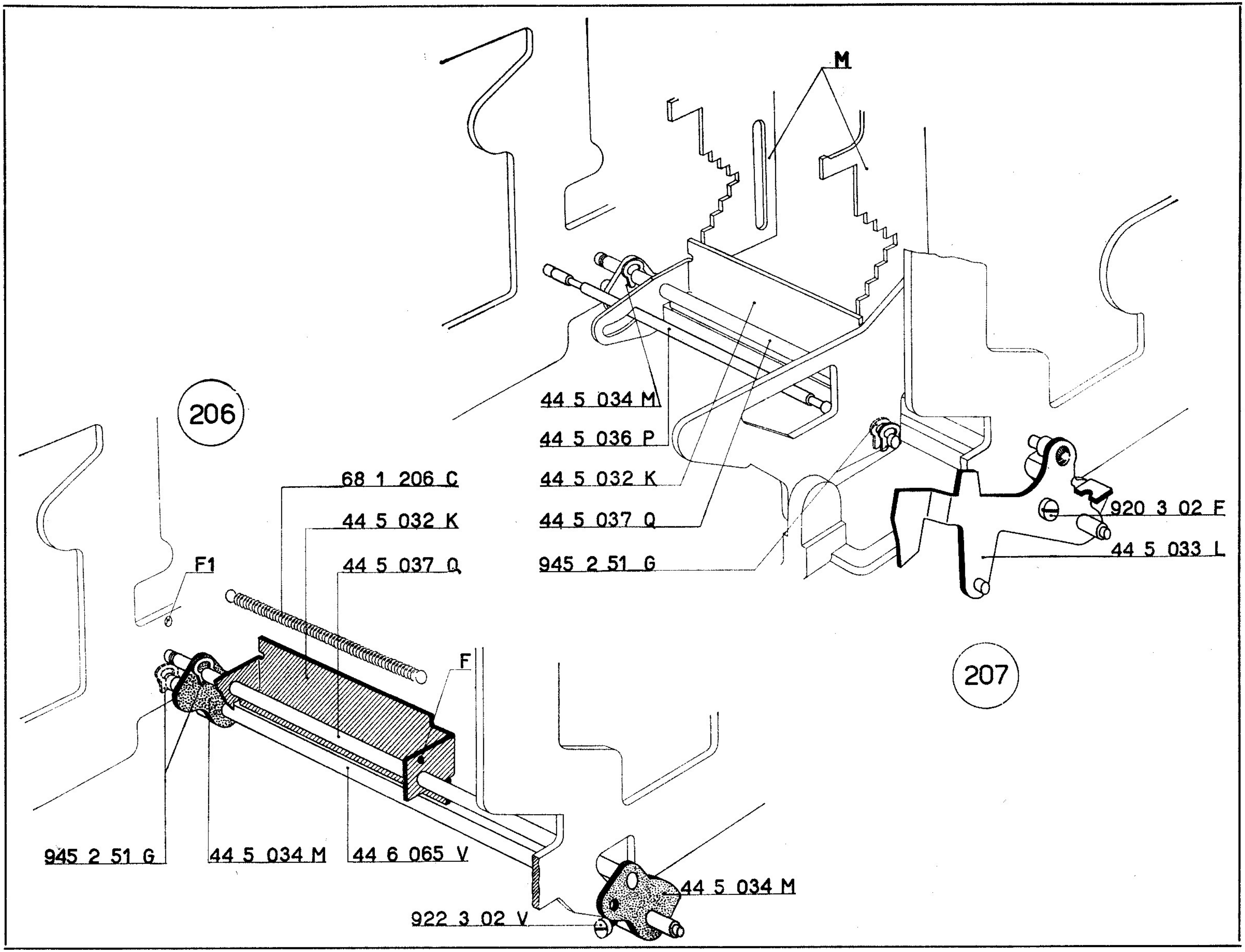
c) *Adjust the axial position of the crank* 44 5 034 M *(internal) to leave a little axial play to the shaft* 44 5 037 Q.

Tighten but not right home the screw of the crank.

d) *Move the small multiplier racks* **M** *to the position illustrated in the figure. Move the plate* 44 5 032 K *to contact all the small racks and then tighten the screw of the internal crank* 44 5 034 M.

e) Between the hole **F** of the plate 44 5 032 K and the hole **F1** of the right internal side-plate, hook the spring 68 1 206 C (figure 206).

44 5 032 K	Entry control plate
44 5 033 L	External arm of the entry control plate frame
44 5 034 M	Entry control plate frame crank
44 5 036 P	Entry control plate rear shaft
44 5 037 Q	Entry control plate front shaft
44 6 065 V	Entry control frame shaft
68 1 206 C	Spring for 44 5 032 K
920 3 02 F	Securing screw for 44 5 033 L
922 3 02 V	Screw for 44 5 034 M
945 2 51 G	Spring-clip


M
206
44 5 034 M
44 5 036 P
44 5 032 K
44 5 037 Q
945 2 51 G
920 3 02 F
44 5 033 L
68 1 206 C
44 5 032 K
44 5 037 Q
F1
F
207
945 2 51 G
44 5 034 M
44 6 065 V
44 5 034 M
922 3 02 V

153 - FIGURE 208

Assembling the stroke-counter bridge on the proper frame.

On the stroke-counter frame 44 5 062 Z assemble as illustrated in the figure the stroke-counter bridge 44 5 063 S securing it by means of a spring-clip 945 2 21 S.

154 - FIGURE 209

Assembling the stroke-counter frame and the stroke-counter testing lever.

a) Between the two internal side-plates of the machine place the stroke-counter frame prepared in the precedent paragraph. Pivot it on the pivot **K** and secure it by means of a spring-clip 945 2 21 S. Its pivot **P** should be inserted in the slot of the arm 44 5 114 J precedently assembled.

b) In the appropriate hole of the left external side-plate of the machine insert the shaft 44 5 058 D on which should be placed:

— the stroke-counter testing hook lever 44 5 057 U

— the left arm of the frame 44 5 062 Z.

The lever 44 5 057 U should rest on the pivot **P1** of the bridge 44 5 063 S.

c) In the appropriate seats of the shaft 44 5 058 D place one spring-clip 945 2 21 S and one 945 3 41 A.

44 5 036 P	Setting control plate rear shaft
44 5 057 U	Stroke-counter testing hook-lever
44 5 058 D	Shaft of stroke-counter testing hook-lever
44 5 062 Z	Stroke-counter frame
44 5 063 S	Stroke-counter bridge
44 5 114 J	Stroke-counter frame control arm
44 5 437 N	Division stroke-counter and multiplication stop release lever

155 - FIGURE 210

Assembling the automatic tabulation control lever and the lever 44 5 437 N.

a) On the outside of the shaft 44 5 058 D place successively:

— the automatic tabulation control lever 44 6 014 J

— the division stroke-counter control and multiplication stop release lever 44 5 437 N with the screw 922 3 02 V.

b) *Adjust the position of the lever* 44 5 437 N *to leave a very little axial play to the shaft* 44 5 058 D.

Tighten the screw of the lever.

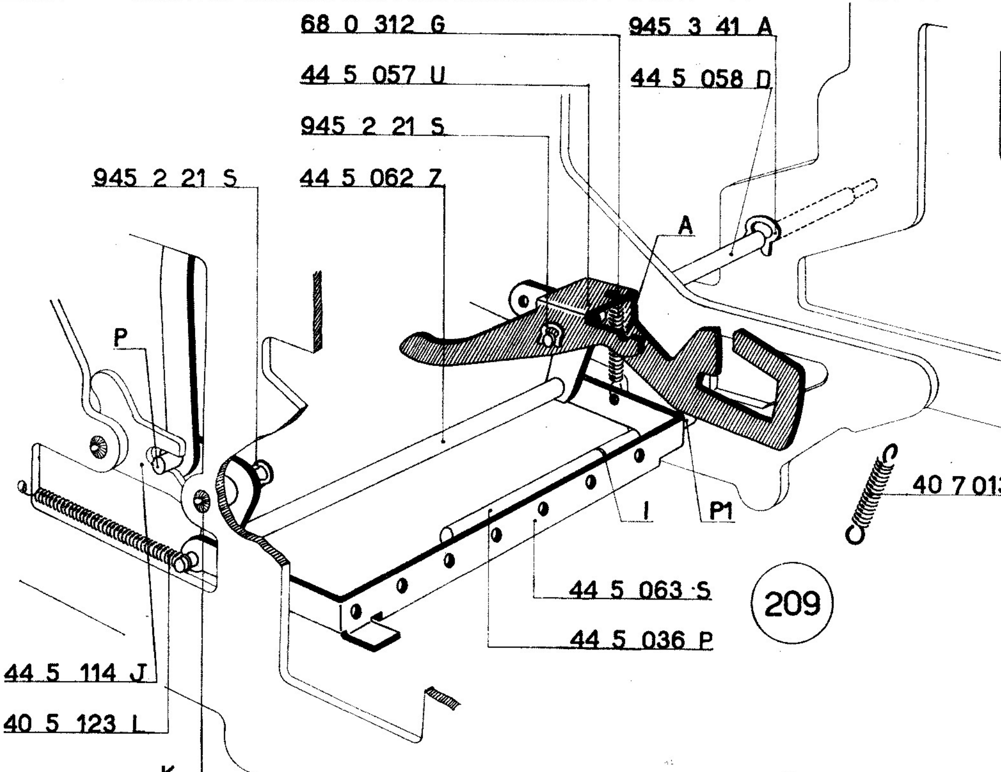
c) Between the lever 44 6 014 J and the lever 44 5 437 N, hook the spring 40 4 052 X.

d) Between the lever 44 5 057 U and the bridge 44 5 063 S, hook the spring 68 0 312 G (figure 209).

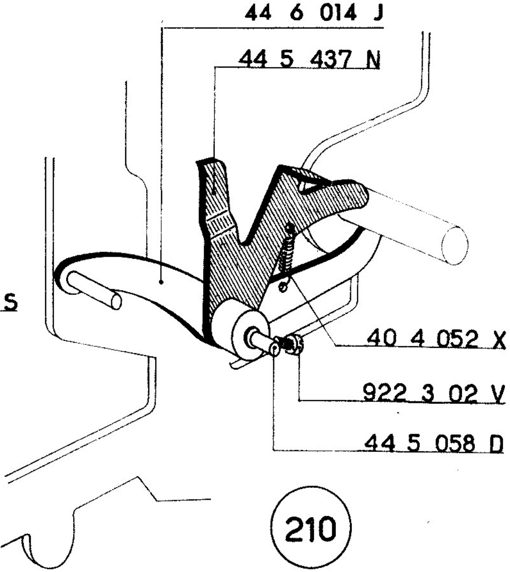
e) Between the hook **A** of the lever 44 5 057 U and the appropriate seat **I** of the shaft 44 5 036 P, hook the spring 40 7 013 K.

f) Hook to the frame 44 5 062 Z, the spring 40 5 123 L precedently hooked to the side-plate of the machine (figure 209).

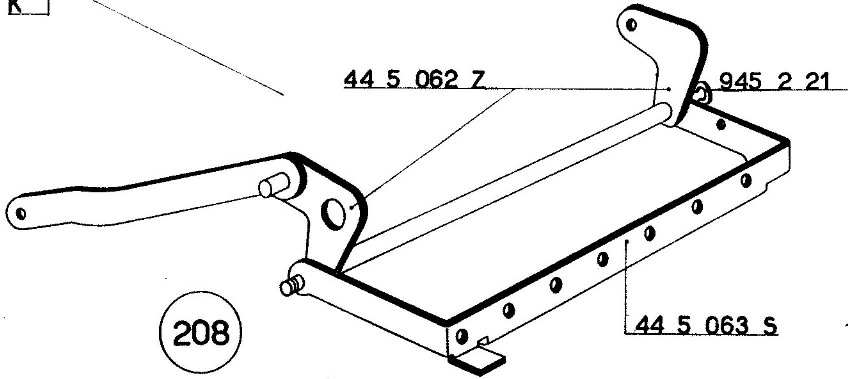
44 6 014 J	Automatic tabulation control lever
40 4 052 X	Spring for 44 5 437 N - 44 6 014 J
40 5 123 L	Spring for 44 5 062 Z
40 7 013 K	Spring for 44 5 057 U
68 0 312 G	Spring for 44 5 057 U - 44 5 063 S
922 3 02 V	Screw for 44 5 437 N
945 2 21 S	Spring-clip
945 3 41 A	Spring-clip


68 0 312 G
945 3 41 A
44 5 057 U
44 5 058 D
945 2 21 S
945 2 21 S
44 5 062 Z
A
P
40 7 013 K
I
P1
44 5 063 S
44 5 036 P
44 5 114 J
40 5 123 L
K

209


44 6 014 J
44 5 437 N
40 4 052 X
922 3 02 V
44 5 058 D

210


44 5 062 Z
945 2 21 S
44 5 063 S

208

156 - FIGURE 211

Assembling the goniometer.

a) Assemble on the main shaft of the machine the appropriate goniometer securing it by means of the proper screw.

b) On the base of the machine cut a short line **A** and place the zero of the goniometer on it.

157 - FIGURES 212 and 213

Adjusting angularly the cam 44 5 359 P.

The cam 44 5 359 P *controls the lever* 44 5 057 U *and, in the figure* 212, *is illustrated its rest position.*

When the cam starts rotating, it moves through the segment **a-b** *the lever* 44 5 057 U *in the direction of the arrow; the segment* **b-c** *will hold the lever in the position reached.*

From the spot **c**, *the cam starts rotating the lever* 44 5 057 U *counter-wise (see arrow - figure* 213). *This movement should start when the main shaft has done a rotation of* 75°.

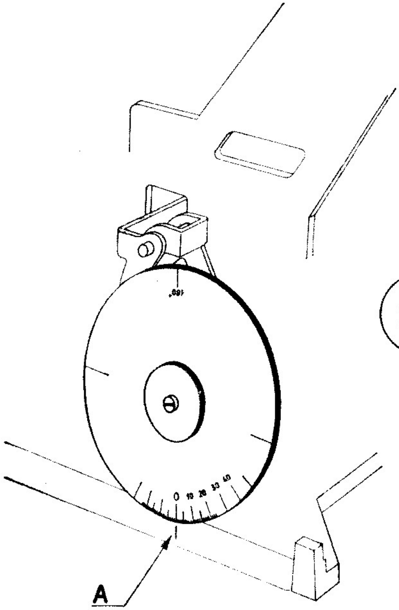
158 - FIGURES 214 and 215

Adjusting the angular position of the cam 44 5 113 R.

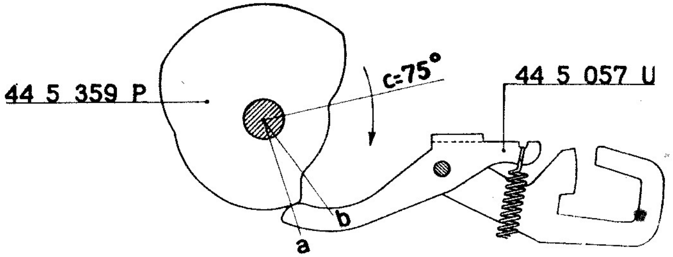
The am 44 5 113 R *controls the arm* 44 5 114 J *and, in the figure* 214, *is illustrated its rest position.*

When the cam starts rotating it doesn't move through the segment **a-b** *(circular) the arm* 44 5 114 J. *From the spot* **b**, *on the contrary, it moves this arm clock-wise (see arrow - figure* 215). *This movement should start when the main shaft has done a rotation of* 105°.

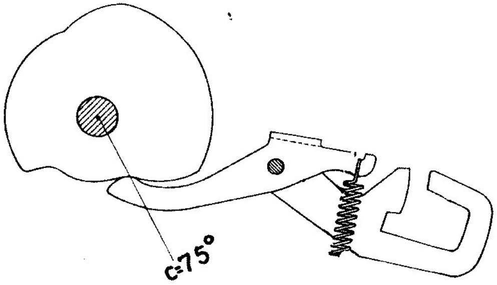
44 5 057 U	Stroke-counter testing hook-lever
44 5 113 R	Stroke-counter frame control cam
44 5 114 J	Stroke-counter frame control arm
44 5 359 P	Small racks clearing control cam



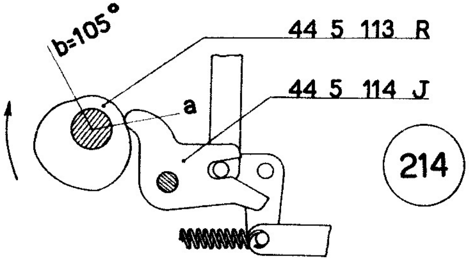
211


44 5 359 P
c=75°
44 5 057 U
b
a

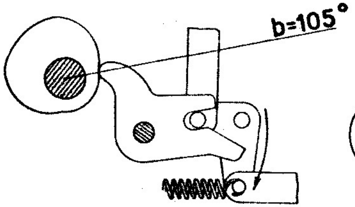
212



213


b=105°
44 5 113 R
44 5 114 J
a

214



215

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UNDERWOOD AGENCY
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Garland, Texas
BR 6-8411

159 - FIGURE 216

Assembling the multiplication connecting-rod.

a) Assemble the multiplication connecting-rod 44 5 038 Z which should take the position illustrated in the figure.

b) Connect it to the arm 44 5 033 L and secure it by means of a spring-clip 945 2 51 G.

160 - FIGURE 216

Assembling the printing control hook; the non-add and subtraction control bridge; the negative and positive multiplication and symbols control bridge.

a) On the ring 44 5 371 B place correctly orientated:

— the printing control hook 44 5 369 R

— the non-add and subtraction control bridge 44 5 370 N

— the negative and positive multiplication and symbols control bridge 44 5 398 F.

b) Assemble this unit on the left external side-plate of the machine seeing that:

— the printing control hook 44 5 369 R is behind the extension **A** of the connecting-rod 44 5 038 Z

— the bent extension of the bridge 44 5 398 F is behind the pivot **P** of the connecting-rod 44 5 038 Z.

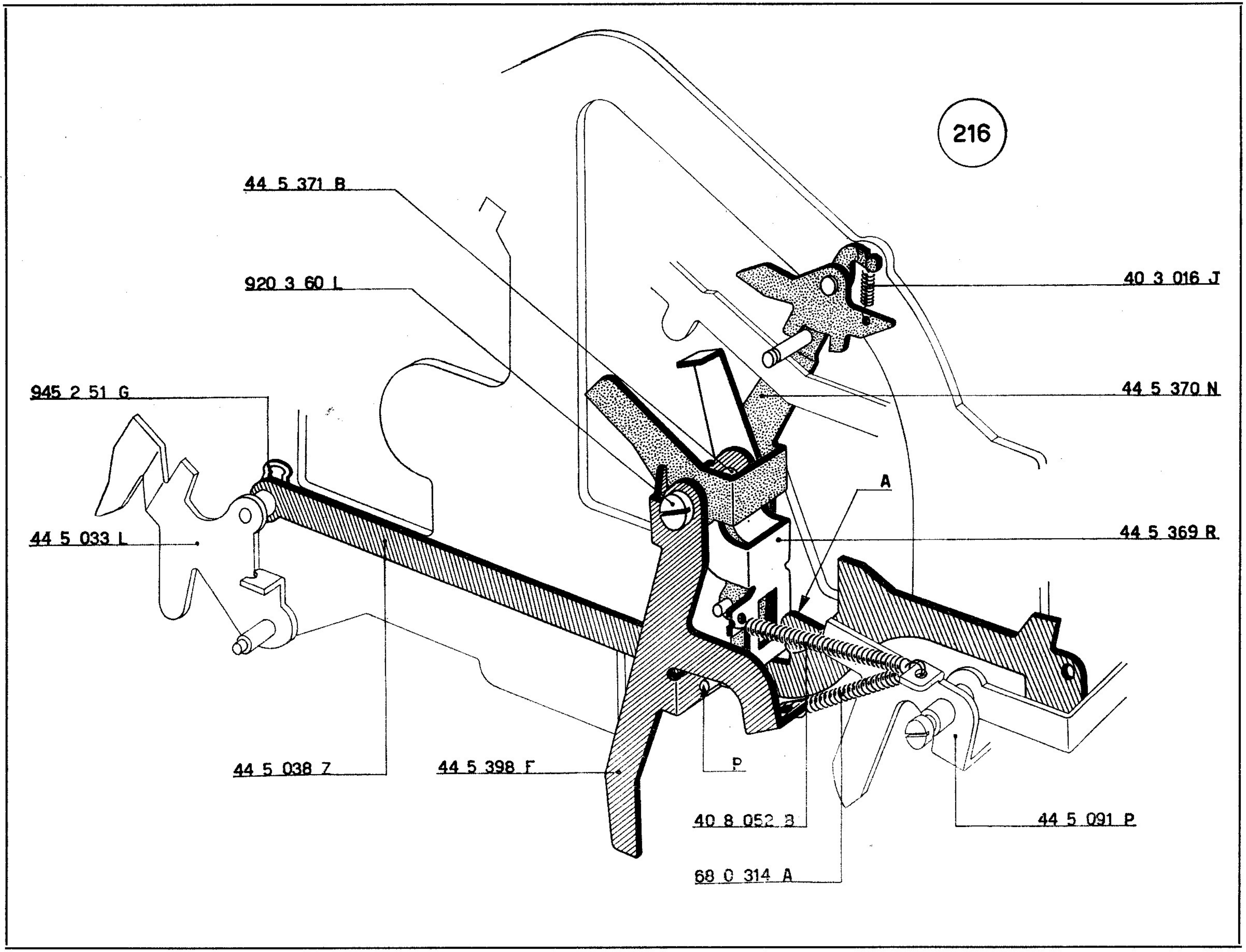
Secure the unit by means of the screw 920 3 60 L.

c) Between the bridge 44 5 370 N and the proper tooth, hook the spring 40 3 016 J.

d) Between the hook 44 5 369 R and the hook 44 5 091 P, hook the spring 40 8 052 B.

e) Between the bridge 44 5 398 F and the hook 44 5 091 P, hook the spring 68 0 314 A.

44 5 033 L	External arm of setting control plate frame
44 5 038 Z	Multiplication connecting-rod
44 5 091 P	Negative multiplication servomechanism hook
44 5 369 R	Printing control hook
44 5 370 N	Non-add subtraction control bridge
44 5 371 B	Ring
44 5 398 F	Negative and positive multiplication and symbols control bridge
40 3 016 J	Spring for 44 5 370 N
40 8 052 B	Spring for 44 5 369 R - 44 5 091 P
68 0 314 A	Spring for 44 5 398 F - 44 5 091 P
920 3 60 L	Screw for 44 5 371 B
945 2 51 G	Spring-clip for 44 5 038 Z


216
44 5 371 B
920 3 60 L
945 2 51 G
44 5 033 L
40 3 016 J
44 5 370 N
A
44 5 369 R
44 5 038 7
44 5 398 F
P
40 8 052 B
68 0 314 A
44 5 091 P

161 - FIGURE 217

Assembling the locking frame and the automatic total exclusion bridge.

Place under the keyboard unit the locking frame 44 5 190 T and the automatic total exclusion bridge 44 5 169 H. Make them take the position illustrated in the figure; it is a temporary position which will be set later on.

162 - FIGURES 217 and 218

Assembling the multiplication current control arm and the non-add connecting-rod.

a) Place on the machine the multiplier current control arm 44 5 039 S with the proper screw 920 3 03 G (figure 217) and the non-add connecting-rod 44 5 052 X (figure 218). This latter should be placed on the pivot **P** of the arm 44 5 029 S and connected to the bridge 44 5 370 N by means of a spring clip 945 2 21 S. In the opening of the connecting-rod insert the pivot of the arm 44 5 133 M. The pivot **P1** of the arm 44 5 039 S should be inserted in the appropriate hole of the connecting-rod 44 5 038 Z (figure 217). Secure with a spring-clip 945 2 21 S. In the opening of the same arm place the pivot of the multiplication key-stem 44 4 305 H.

b) By means of the shaft 44 5 014 R pivot the bridge 44 5 169 H and the arm 44 5 039 S (figure 217). In the proper seat of the shaft place a spring-clip 945 2 21 S; *adjust therefore the position of the arm 44 5 039 S to leave a little axial play to the shaft.* Tighten the screw 920 3 03 G.

163 - FIGURE 217

Assemble the servomechanism control bridge.

a) In the appropriate hole made in the base of the machine insert the pivot of the servomechanism control bridge 44 5 135 P. At the right, the bridge should be secured by means of the pivot 44 5 186 K already assembled on the base of the machine. In the appropriate seat of the pivot place the spring-clip 945 2 21 S.

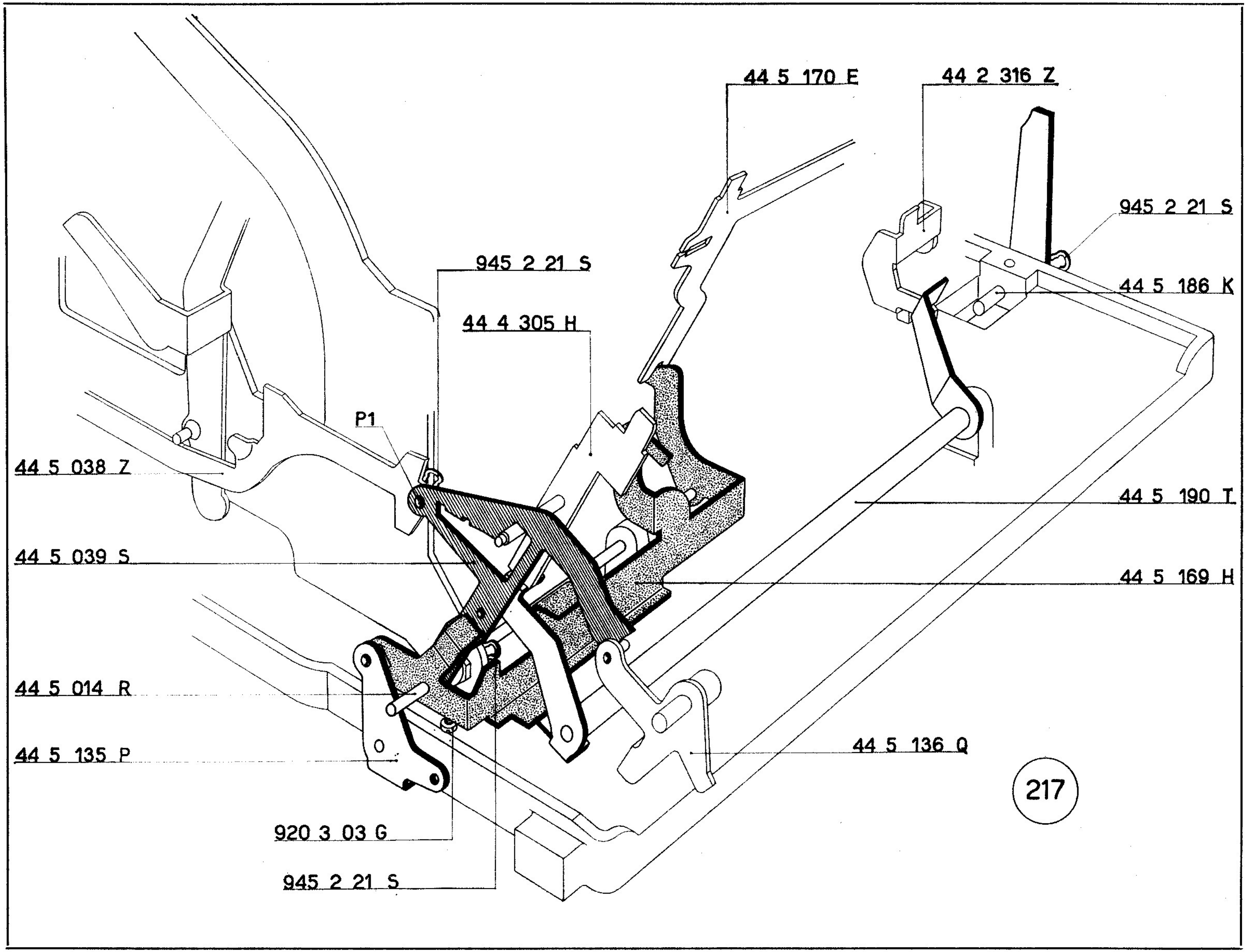
b) *Adjust the position of the pivot 44 5 186 K to obtain the two following conditions:*

— with the stem 44 5 170 E at rest, the bridge 44 5 169 H should be still engaged with the pivot of the bridge 44 5 135 P

— with the stem 44 5 170 E set (that is moved toward the left), the bridge 44 5 169 H should have a little clearance with respect to the bridge 44 5 135 P.

44 2 316 Z	Current-keyboard reciprocal locking rocker
44 4 305 H	Multiplication key-stem
44 5 014 H	Current control arm shaft
44 5 038 Z	Multiplication connecting-rod
44 5 039 S	Multiplicator current control arm
44 5 135 P	Servomechanism control bridge
44 5 136 Q	Current left crank

44 5 169 H	Automatic total exclusion bridge
44 5 170 E	Automatic exclusion button-stem
44 5 186 K	Servomechanism control bridge pivot
44 5 190 T	Locking frame
920 3 03 G	Screw for 44 5 039 S
945 2 21 S	Spring-clip


44 5 170 E
44 2 316 Z
945 2 21 S
945 2 21 S
44 4 305 H
44 5 186 K
P1
44 5 038 Z
44 5 190 T
44 5 039 S
44 5 169 H
44 5 014 R
44 5 135 P
44 5 136 Q
217
920 3 03 G
945 2 21 S

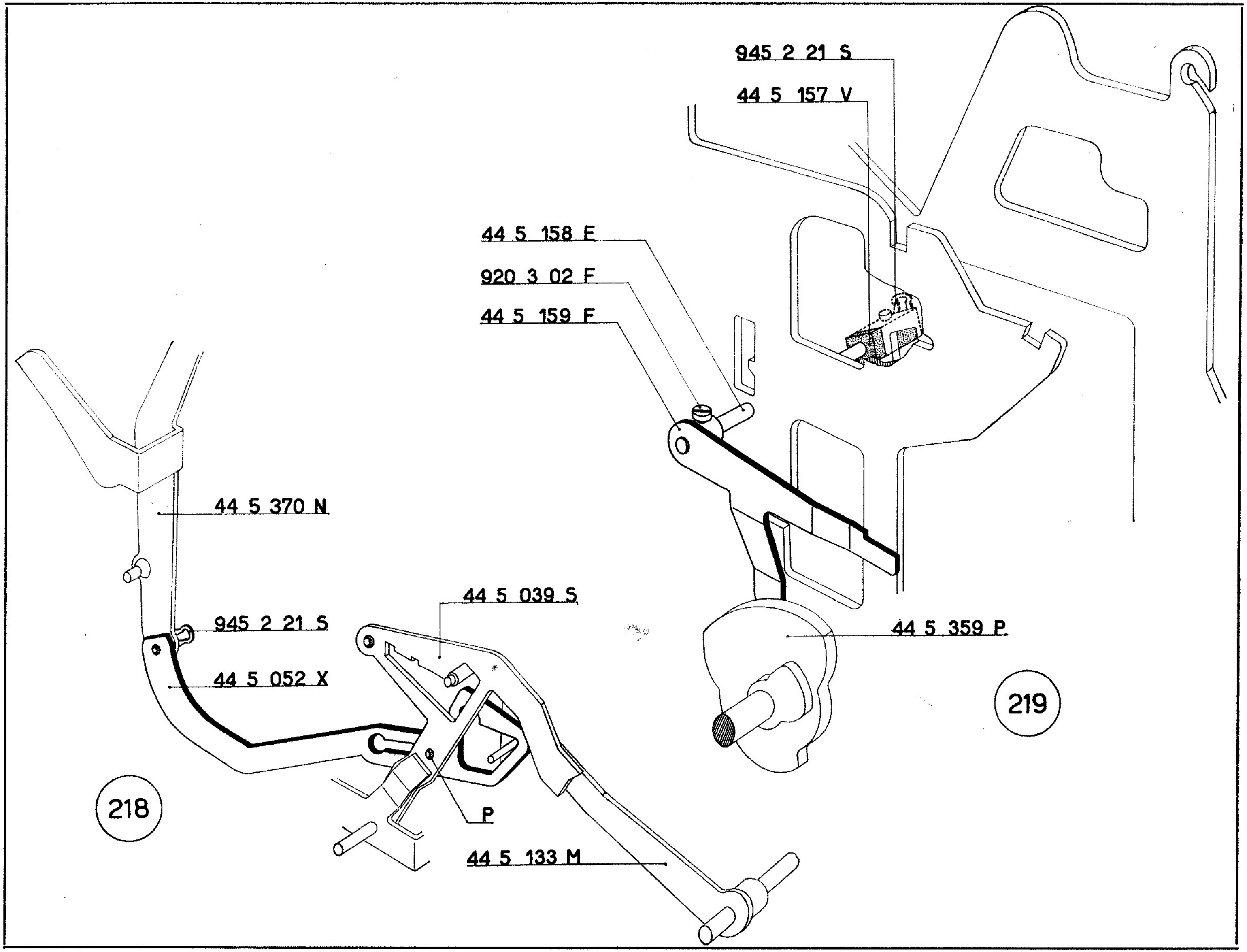
164 - FIGURE 219

Assembling the small racks clearing control lever.

a) On the small block 44 5 157 V place the shaft 44 5 158 E securing it with a spring clip 945 2 21 S.

b) Assemble this unit as illustrated in the figure; on the shaft 44 5 158 E place the small racks clearing control lever 44 5 159 F with the two screws 920 3 02 F.

44 5 039 S	Multiplicator current control arm
44 5 052 X	Non-add connecting-rod
44 5 133 M	Servomechanism selector stay control left arm
44 5 157 V	Small racks clearing control block
44 5 158 E	Small racks clearing control shaft
44 5 159 F	Small racks clearing control lever
44 5 359 P	Small racks clearing control cam
44 5 370 N	Non-add and subtraction control bridge
920 3 02 F	Screw for 44 5 159 F
945 2 21 S	Spring-clip


945 2 21 S
44 5 157 V
44 5 158 E
920 3 02 F
44 5 159 F
44 5 370 N
44 5 039 S
945 2 21 S
44 5 052 X
44 5 359 P
219
218
P
44 5 133 M

165 - FIGURE 220

Assembling the small racks clearing control connecting-rod.

a) Between the pivot of the small block 44 5 157 V and the bridge 44 5 148 C assemble the small racks clearing control connecting-rod 44 6 044 Y. Secure it with a spring clip 945 2 21 S.

b) Between the hole **F1** of the connecting-rod 44 6 044 Y and the hole **F** of the connecting-rod 44 6 038 S, hook the spring 40 5 126 P.

44 5 136 Q	Current left crank
44 5 148 C	Memory connecting-rod and slider connection bridge
44 5 157 V	Small rack clearing control block
44 5 180 Z	Guide left comb
44 5 190 T	Locking frame
44 6 038 S	Division stop connecting-rod
44 6 044 Y	Small racks clearing control connecting-rod

166 - FIGURE 220

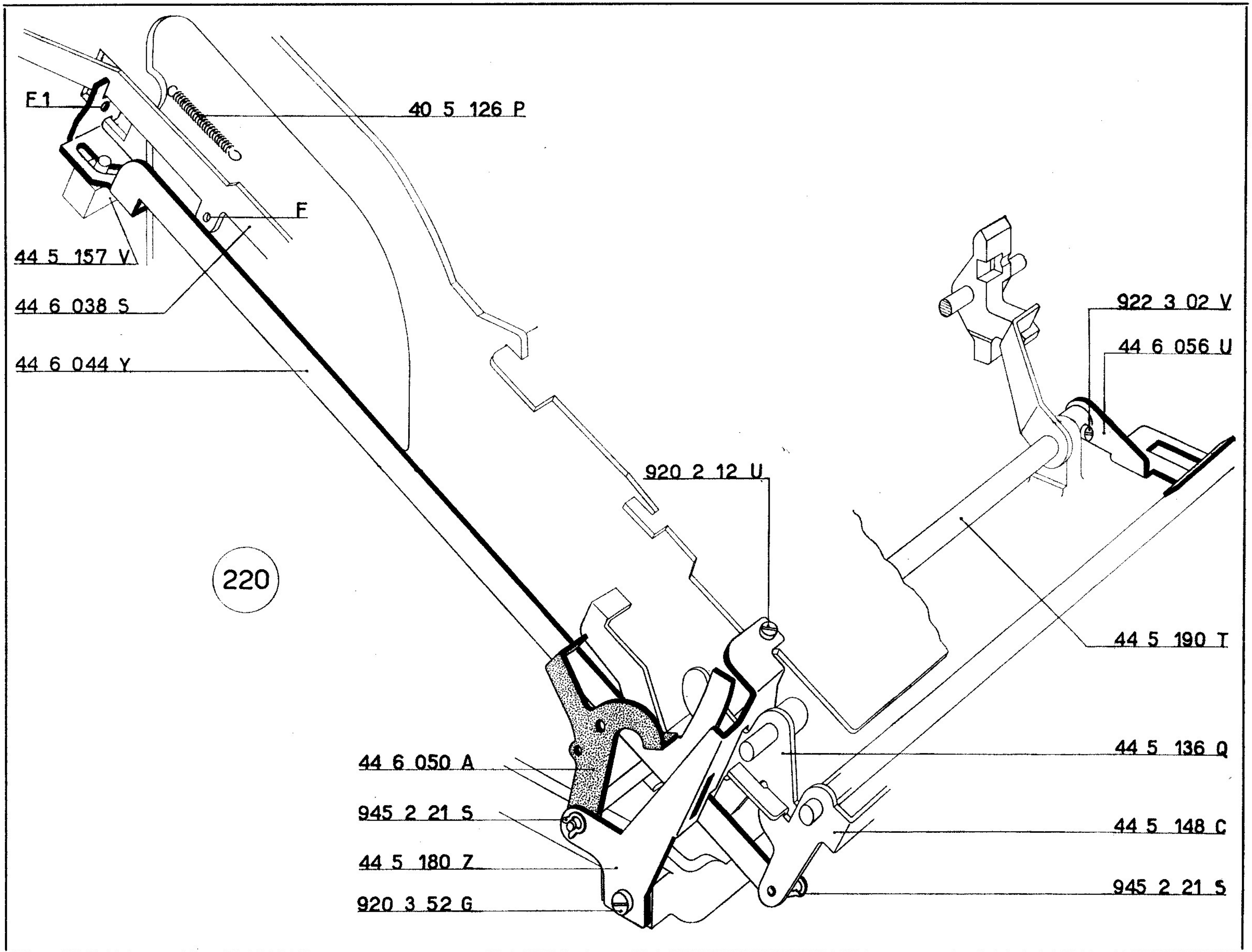
Assembling the automatic quotient arm.

a) By means of the shaft of the automatic quotient arm 44 6 050 A pivot the locking frame 44 5 190 T. At the right end of this shaft place the sliders stop arm 44 6 056 U with the proper screw 922 3 02 V.

b) Between the base of the machine and the keyboard plate assemble again the comb 44 5 180 Z securing it with a screw 920 3 52 G and a screw 920 2 12 U.

c) Pivot the shaft of the arm 44 6 050 A in the appropriate hole of the comb 44 5 180 Z; secure it with a spring clip 945 2 21 S.

44 6 050 A	Automatic quotient arms
44 6 056 U	Sliders stop arm
40 5 126 P	Spring for 44 6 044 Y - 44 6 038 S
920 2 12 U	Setting screw for 44 5 180 Z
920 3 52 G	Setting screw for 44 5 180 Z
922 3 02 V	Screw for 44 6 056 U
945 2 21 S	Spring-clip



F1
40 5 126 P
F
44 5 157 V
44 6 038 S
44 6 044 Y
220
922 3 02 V
44 6 056 U
920 2 12 U
44 5 190 T
44 5 136 Q
44 6 050 A
945 2 21 S
44 5 148 C
44 5 180 Z
945 2 21 S
920 3 52 G

167 - FIGURES 221 and 222

Adjusting the memory connecting-rod and slider connection bridge.

a) Move the main shaft of the machine to rest.

b) In these conditions:

— the pivot **P1** *of the small block* 44 5 157 V *should mesh exactly with the curve of the slot of the connecting-rod* 44 6 044 Y *(figure* 221)

— the current control arm 44 6 006 T *should be able to pass with respect to the front extension of the connecting-rod* 44 6 044 Y *with a clearance of* 0.2÷0.3 *mm. (figure* 222).

These two conditions are obtained by acting suitably on the left arm of the bridge 44 5 148 C.

44 5 148 C	Memory connecting-rod and slider connection bridge
44 5 157 V	Small racks clearing control block
44 5 159 F	Small racks clearing control lever

168 - FIGURE 221

Adjusting the small racks clearing control lever.

a) Move the main shaft of the machine to rest.

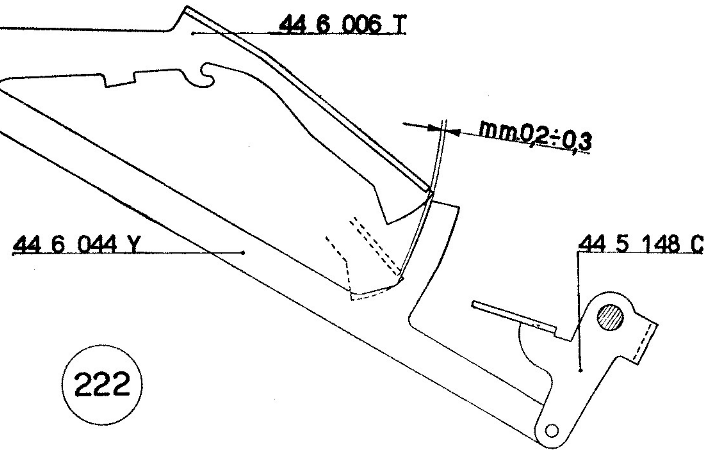
b) Assemble the two screws of the lever 44 5 159 F.

c) Adjust the axial position of the lever 44 5 159 F *wich lower arm should be placed between the screw of the cam* 44 5 359 P *and the profile* **P.**

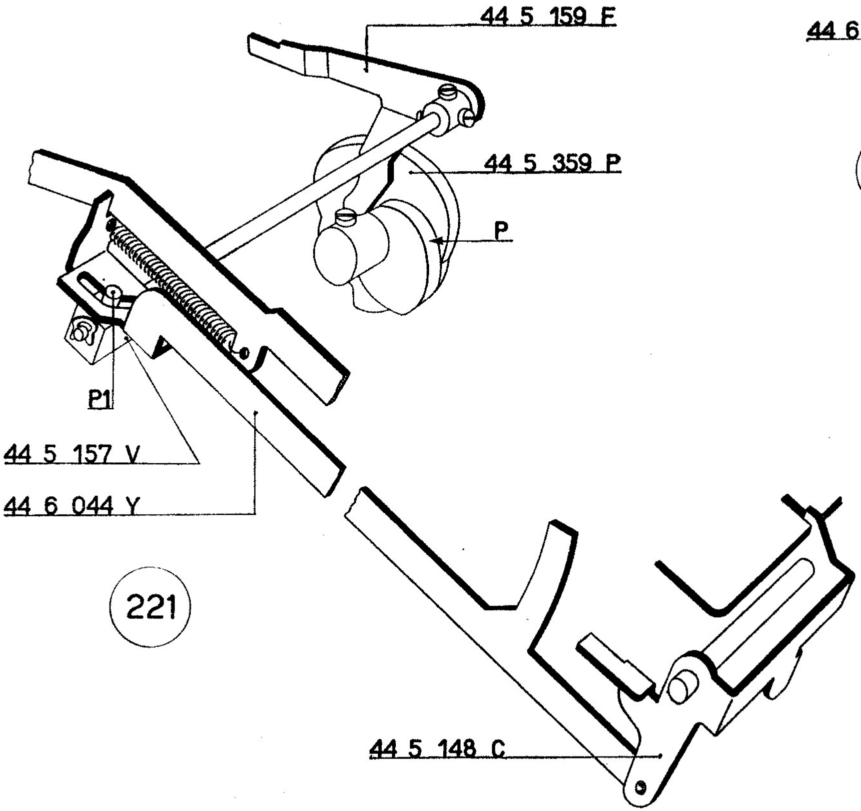
Tighten the two screws of the lever.

d) Check that the connecting-rod 44 6 044 Y *as well as the small block* 44 5 157 V *slide perfectly.*

44 5 359 P	Small racks clearing control cam
44 6 006 T	Current control arm
44 6 044 Y	Small racks clearing control connecting-rod


44 6 006 T
mm0,2÷0,3
44 6 044 Y
44 5 148 C

222


44 5 159 F
44 5 359 P
P
P1
44 5 157 V
44 6 044 Y
44 5 148 C

221

169 - FIGURE 223

Assembling the small connecting-rod 44 5 381 W; the negative multiplication control bridge; the memory engagement control connecting-rod control crank.

a) On the pivot 44 6 054 S place:

— the negative multiplication control bridge 44 5 090 S

— the small connecting-rod 44 5 381 W

— the memory engagement control connecting-rod control crank 44 6 053 Z which should be guided by the shaft of the arm 44 4 416 Q also.

b) Secure the parts assembled by means of two spring-clips 945 3 41 A.

c) Connect the small connecting-rod 44 5 381 W to the pivot of the « multiplication control » key-stem; secure with a spring-clip 945 2 21 S.

d) Hook the spring 68 0 409 K between the bridge 44 5 090 S and the bridge 44 5 370 N.

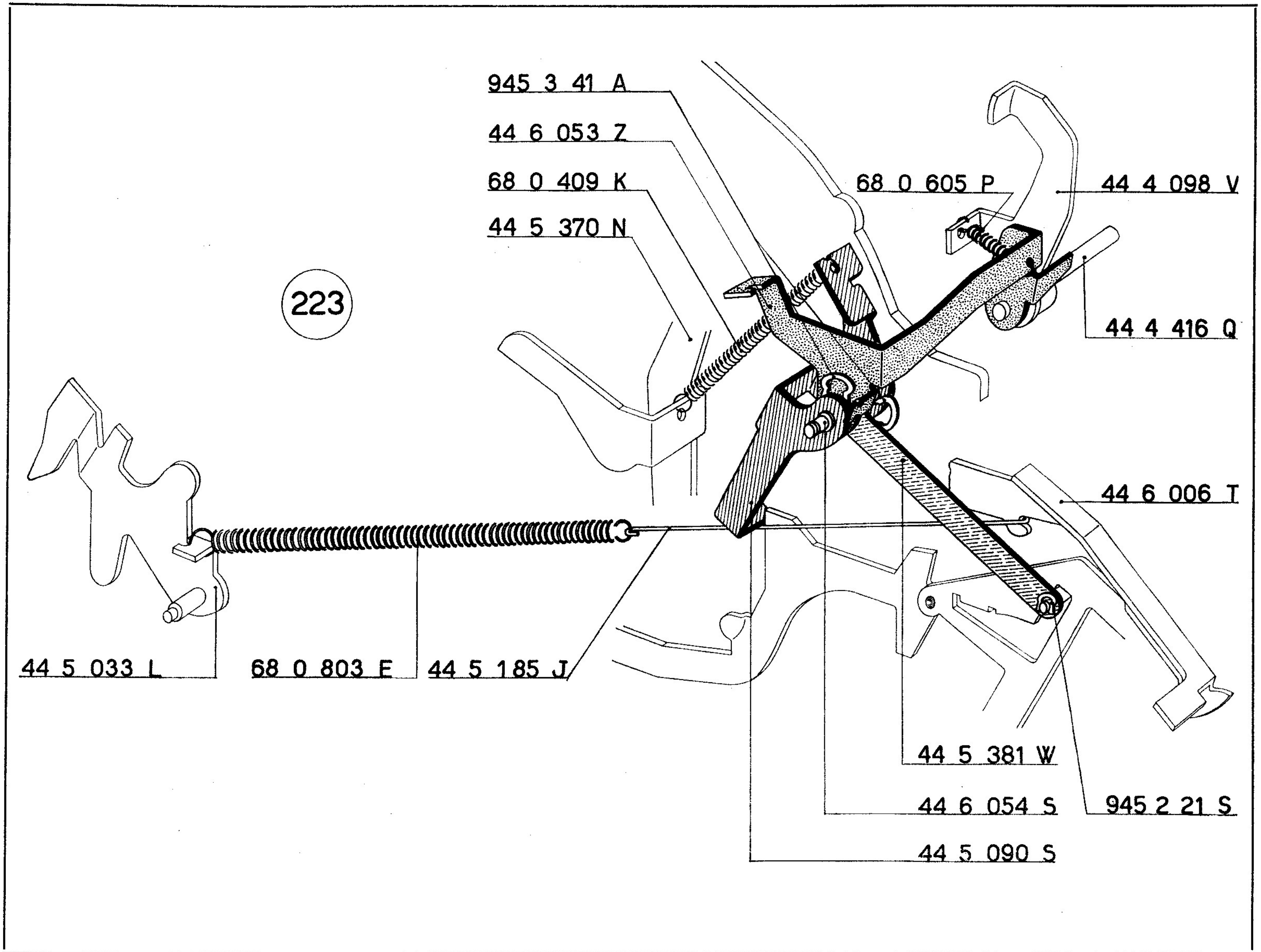
e) Hook the spring 68 0 605 P between the crank 44 6 053 Z and the arm 44 4 098 V.

170 - FIGURE 223

Assembling the spring of the current control arms.

Between the arm 44 5 033 L and the current control arm 44 6 006 T hook the spring 68 0 803 E with the proper stay 44 5 185 J.

44 4 098 V	Total inversion control left arm
44 4 416 Q	Total inversion control right arm
44 5 033 L	Setting control plate frame external arm
44 5 090 S	Negative multiplication control bridge
44 5 185 J	Current control arms spring stay
44 5 370 N	Non-add and subtraction control bridge
44 5 381 W	Small connecting-rod
44 6 006 T	Current control arm
44 6 053 Z	Memory engagement control connecting-rod control crank
44 6 054 S	Guide pivot
68 0 409 K	Spring for 44 5 370 N - 44 5 090 S
68 0 605 P	Spring for 44 4 098 V - 44 6 053 Z
68 0 803 E	Spring for 44 6 006 T
945 2 21 S	Spring-clip for 44 5 381 W
945 3 41 A	Spring-clip


223
945 3 41 A
44 6 053 Z
68 0 409 K
44 5 370 N
68 0 605 P
44 4 098 V
44 4 416 Q
44 6 006 T
44 5 033 L
68 0 803 F
44 5 185 J
44 5 381 W
44 6 054 S
945 2 21 S
44 5 090 S

171 - FIGURE 224

Adjusting the quotient and multiplication small racks stabilizing frame.

Disengage the memory unit by moving the cam-lever 44 5 154 S *to the position illustrated in the figure. In this position the teeth* 44 5 010 Z *should surely hold the small racks* **M** *which must be anyhow free to trip from one position to the next. This condition is obtained by moving suitably and vertically the screw* 50 6 007 Z *which establishes the position of the frame* 44 5 011 N.

The ideal condition requested is obtained when by moving the memory unit from engaged position to disengaged one, the springs 44 5 012 P *are compressed by about* 0.2 *mm.*

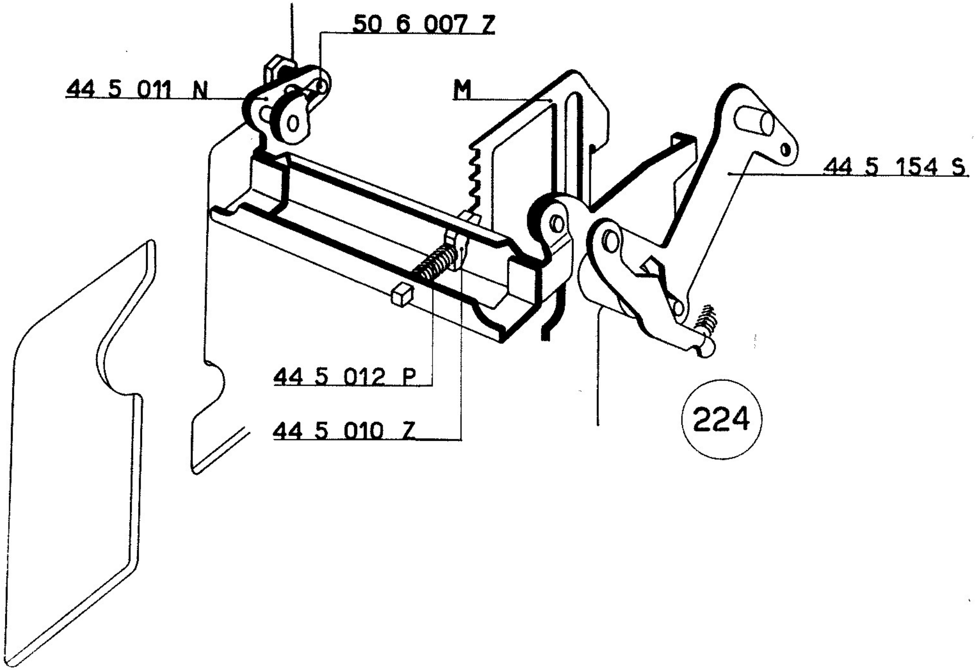
172 - FIGURE 225

Adjusting the multiplication control.

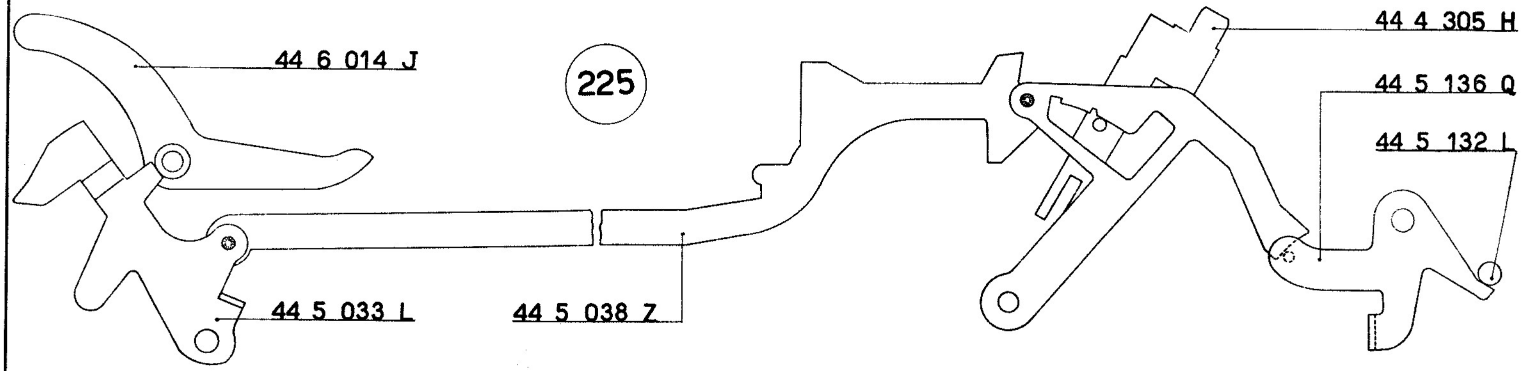
Depress the « multiplication control » key 44 4 305 H. *Check that the arm* 44 5 033 L *rests on the hub of the lever* 44 6 014 J *and that the crank* 44 5 136 Q *rests on the shaft* 44 5 132 L. *We tolerate that between the above crank and the shaft there is a maximum clearance of* 0.1 *mm.*

The condition is obtained by acting on the multiplication connecting-rod 44 5 038 Z.

44 4 305 H	« Multiplication control » key-stem
44 5 010 Z	Small racks stabilizing tooth
44 5 011 N	Stabilizing teeth frame
44 5 012 P	Spring for stabilizing teeth
44 5 033 L	External arm of the entry control plate frame
44 5 038 Z	Multiplication connecting-rod
44 5 132 L	Shaft of the rod control right arm
44 5 136 Q	Current left crank
44 5 154 S	Small racks frame engagement cam-lever
44 6 014 J	Automatic tabulation control lever
50 6 007 Z	Sspecial screw


50 6 007 Z
44 5 011 N
M
44 5 154 S
44 5 012 P
44 5 010 Z

224


44 6 014 J
44 4 305 H
44 5 136 Q
44 5 132 L
44 5 033 L
44 5 038 Z

225

173 - FIGURE 226

Adjusting the entry control plate.

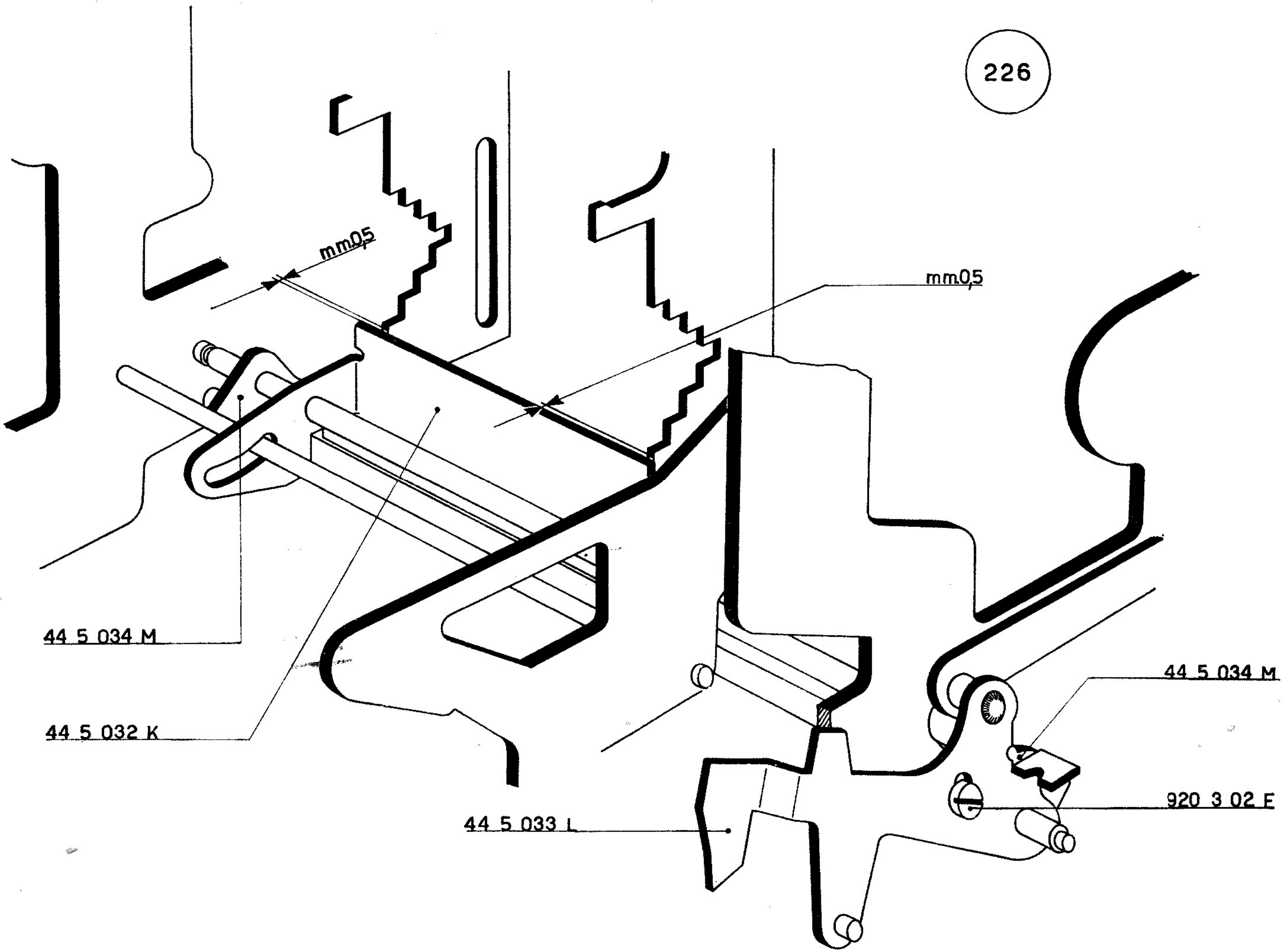
a) ove the machine to rest and disengage the memory unit.

b) Move the small memory racks to position « four ».

c) Loosen the screw 920 3 02 F; *adjust the angular position of the crank* 44 5 034 M *until obtaining the reading shown in the figure. Tighten the screw* 920 3 02 F.

44 5 032 K	Entry control plate
44 5 033 L	External arm of the entry control plate frame
44 5 034 M	Entry control plate frame crank
920 3 02 F	Screw for 44 5 033 L

226


mm0,5
mm0,5
44 5 034 M
44 5 032 K
44 5 034 M
920 3 02 F
44 5 033 L

174 - FIGURE 227

Assembling the multiplication stop control lever; the multiplication tester and division connecting-rod control bridge; the line-space control lever; the division stop control arm.

a) Locate on the left external side-plate of the machine:

— the multiplication tester and division connecting-rod control bridge 44 5 417 J with the spring 68 0 504 A

— the line-space control lever 44 7 060 D

— the division stop control arm 44 6 033 M with the two screws 922 3 01 U, which should be successively pivoted by means of the shaft of the multiplication stop control lever 44 5 060 B.

b) *Adjust the position of the arm* 44 6 033 M *to leave a little axial play to the lever* 44 5 060 B.

Tighten but not right home one of the two screws of the arm.

175 - FIGURES 227 and 228

Assembling the division and multiplication cams unit.

a) On the main shaft of the machine place the division and multiplication cams unit 44 5 311 X with the proper two screws 922 3 52 W.

b) *Adjust the angular position of the cams unit so that the straight external profile is quite horizontal. Adjust the axial position of the cams unit to center the appropriate parts on the different profiles.*

The cams unit has in fact five different profiles.

While the first profile is free:
the lever 44 5 060 B works on the second
the bridge 44 5 417 J works on the third
the lever 44 5 437 N works on the fourth
the lever 44 6 014 J and the roller of the 44 7 060 D work on the fifth.

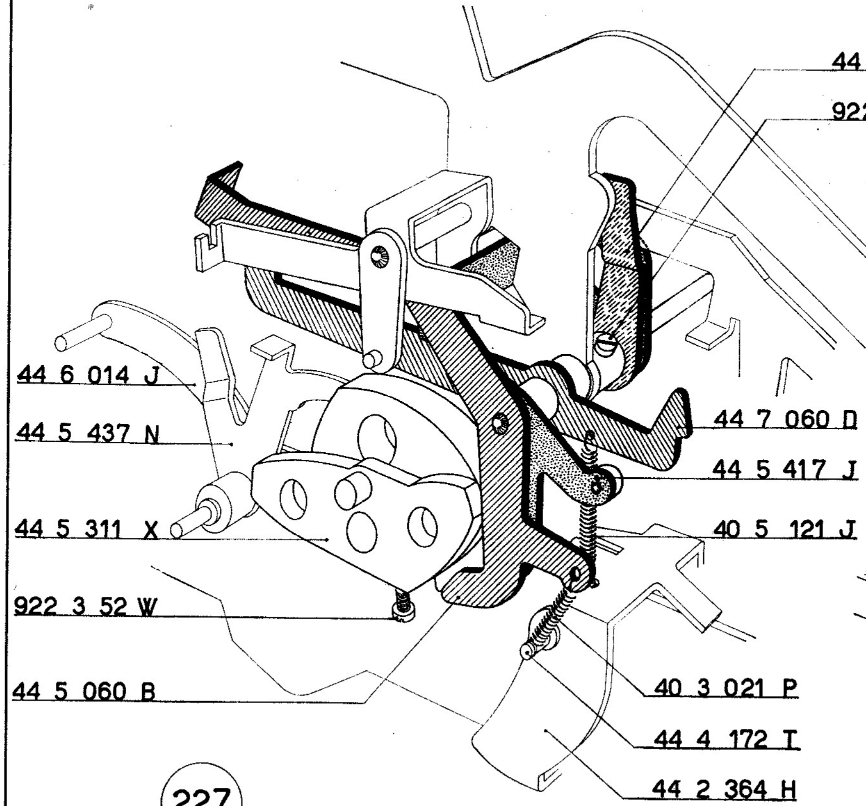
Tighten but not right home one of the screws of the cams unit.

c) Between the lever 44 7 060 D and the lever 44 2 364 H, hook the spring 40 5 121 J.

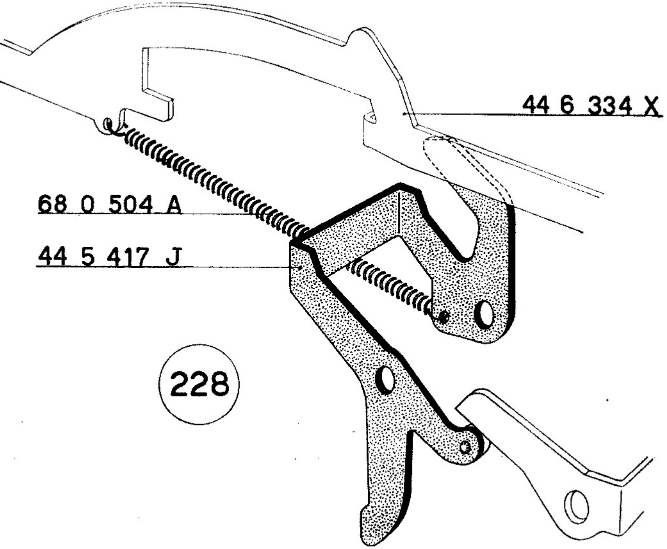
d) Between the lever 44 5 060 B and the shaft 44 4 172 T, hook the spring 40 3 021 P.

e) Hook the spring 68 0 504 A to the connecting-rod 44 6 334 X (figure 228).

44 2 364 H	Transmission bridge control lever
44 4 172 T	Shaft of the lower crank
44 5 060 B	Shaft of the multiplication stop control lever
44 5 311 X	Division and multiplication cams unit
44 5 417 J	Multiplication tester and division connecting-rod control bridge
44 5 437 N	Division stroke-counter control and multiplication stop release lever
44 6 014 J	Automatic tabulation control lever
44 6 033 M	Division stop control arm
44 6 334 X	Division connecting-rod with stop pawl
44 7 060 D	Line-space control lever
40 3 021 P	Spring for 44 5 060 B
40 5 121 J	Spring for 44 7 060 D - 44 2 364 H
68 0 504 A	Spring for 44 5 417 J - 44 6 334 X
922 3 01 U	Screw for 44 6 033 M
922 3 52 W	Screw for 44 5 311 X


44 6 033 M
922 3 01 U
44 6 014 J
44 5 437 N
44 7 060 D
44 5 417 J
44 5 311 X
40 5 121 J
922 3 52 W
44 5 060 B
40 3 021 P
44 4 172 T
44 2 364 H

227


44 6 334 X
68 0 504 A
44 5 417 J

228

176 - FIGURE 229

Adjusting the division stop control arm.

a) Start the machine and rotate the main shaft until moving the cams unit 44 5 311 X *to the position illustrated in the figure.*

b) Adjust the angular position of the arm 44 6 033 M *to obtain the reading shown in the figure. Tigthen the screws of the crank* 44 6 033 M *and check that the shaft of the lever* 44 5 060 B *has a little axial play.*

44 5 060 B	Shaft of the multiplication stop control lever
44 5 417 J	Multiplication tester and division connecting-rod control bridge
44 5 311 X	Division and multiplication cams unit

177 - FIGURE 230

Adjusting the multiplication tester and division connecting-rod control bridge.

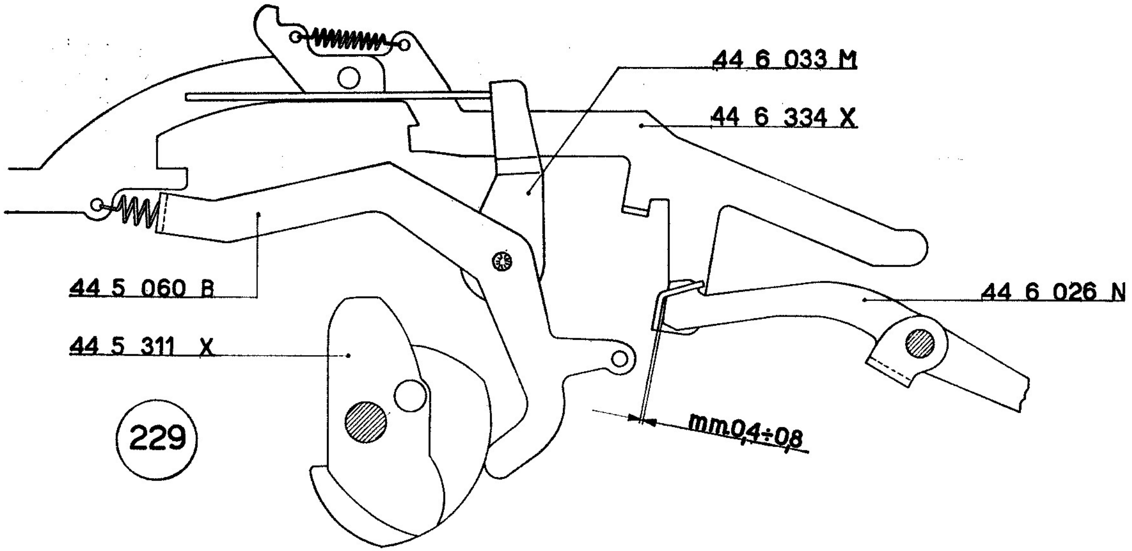
a) Move the main shaft of the machine to rest.

b) Rotate clockwise the bridge 44 6 026 N.

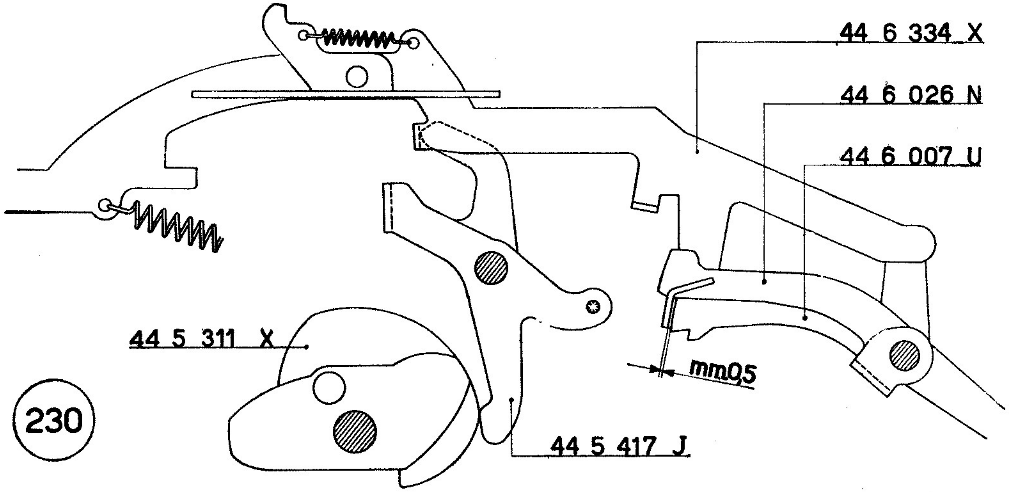
c) Check the reading shown in the figure. Act if necessary on the bridge 44 5 417 J.

44 6 007 U	Division connecting-rod stop crank
44 6 026 N	Division connecting-rod release bridge
44 6 033 M	Division stop control arm
44 6 334 X	Division connecting-rod with stop pawl

229


44 6 033 M
44 6 334 X
44 5 060 B
44 6 026 N
44 5 311 X
mm0,4÷0,8

230


44 6 334 X
44 6 026 N
44 6 007 U
44 5 311 X
mm0,5
44 5 417 J

178 - FIGURE 231

Assembling the memory engagement control connecting-rod and the proper hook.

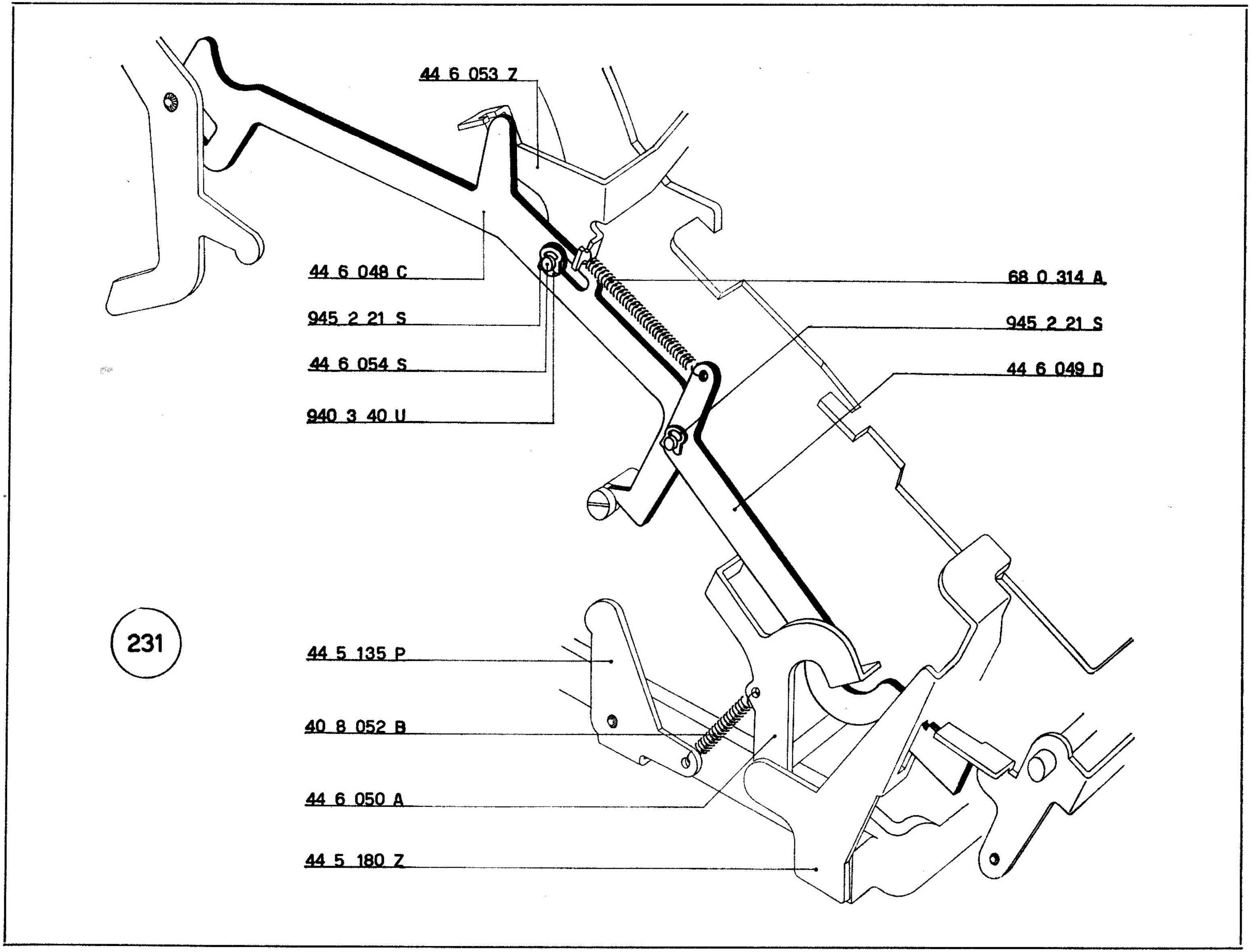
a) On the left external side-plate of the machine assemble the memory engagement control connecting-rod 44 6 048 C; secure it to the pivot 44 6 054 S by means of a spring-clip 945 2 21 S and by interposing the washer 940 3 40 U.

b) In the guide slot of the comb 44 5 180 Z locate the hook 44 6 049 D. Connect this latter to the connecting-rod 44 6 048 C and secure it with a spring-clip 945 2 21 S.

c) Between the hook 44 6 049 D and the crank 44 6 053 Z, hook the spring 68 0 314 A.

d) Between the arm 44 6 050 A and the bridge 44 5 135 P, hook the spring 40 8 052 B.

44 5 135 P	Servomechanism control bridge
44 5 180 Z	Guide left comb
44 6 048 C	Memory engagement control connecting-rod
44 6 049 D	Hook of the memory engagement control connecting-rod
44 6 050 A	Automatic quotient arm
44 6 053 Z	Memory engagement control connecting-rod control crank
44 6 054 S	Memory engagement connecting-rod guide pivot
40 8 052 B	Spring for 44 5 135 P - 44 6 050 A
68 0 314 A	Spring for 44 6 053 Z - 44 6 049 D
940 3 40 U	Washer
945 2 21 S	Spring-clip


44 6 053 Z
44 6 048 C
945 2 21 S
44 6 054 S
940 3 40 U
68 0 314 A
945 2 21 S
44 6 049 D
44 5 135 P
40 8 052 B
44 6 050 A
44 5 180 Z

231

179 - FIGURES 232 and 233

Adjusting the angular position of the sliders stop arm.

a) Move the main shaft of the machine to rest.

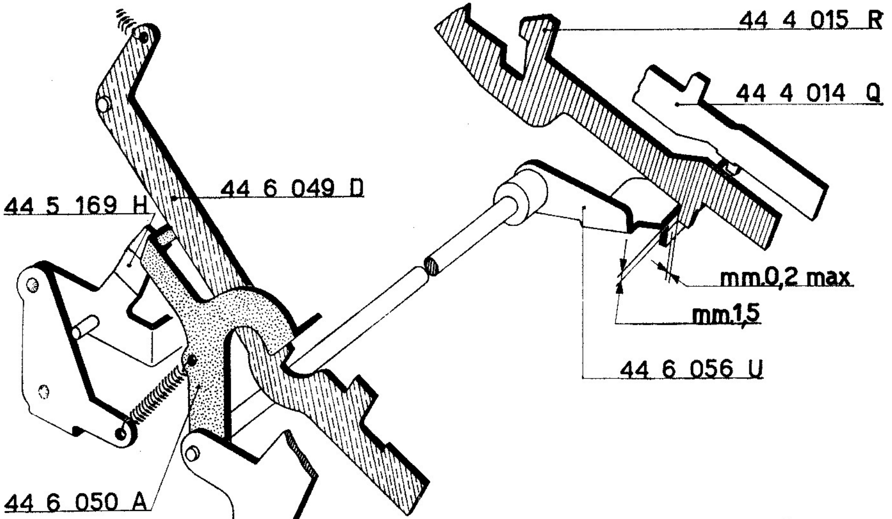
b) Set the automatic total key.

c) Lower the hook 44 6 049 D *so that the arm* 44 6 050 A *rests on the bridge* 44 5 169 H *(figure* 232*).*

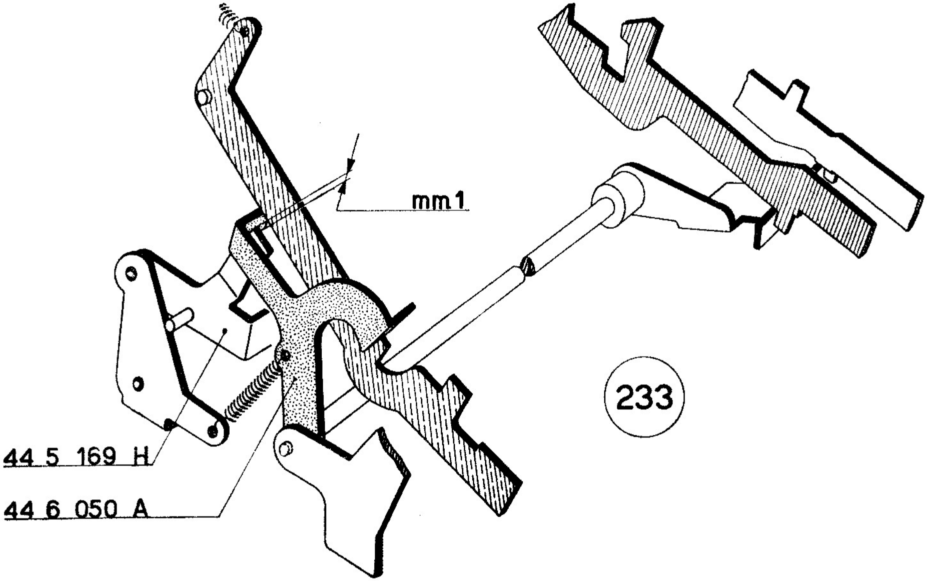
d) Adjust the angular position of the sliders stop arm 44 6 056 U *to obtain the reading shown in the figure* 232*. Creck also that the arm is at* 0.2 *mm. (maximum value) from the extensions of the two sliders* 44 4 014 Q *and* 44 4 015 R*. Act if necessary on the bent part of the arm.*

e) Rotate the bridge 44 5 169 H *to make it engage with the arm* 44 6 050 A *(figure* 233*). Check the reading of* 1 *mm. shown in the same figure. Check again if necessary the adjustment described at point* d).

44 4 014 Q	First register total and calculation slider
44 4 015 R	Second register total and calculation slider
44 5 169 H	Automatic total exclusion bridge
44 6 049 D	Memory engagement control connecting-rod hook
44 6 050 A	Automatic quotient arm
44 6 056 U	Sliders stop arm


44 4 015 R
44 4 014 Q
44 6 049 D
44 5 169 H
mm 0,2 max
mm 1,5
44 6 056 U
44 6 050 A

232


mm 1
44 5 169 H
44 6 050 A

233

180 - FIGURES 234 - 235 - 236

Adjusting the memory engagement control cinematic.

a) Move the main shaft of the machine to rest.

b) Move the automatic total key toward the left (position « on »).

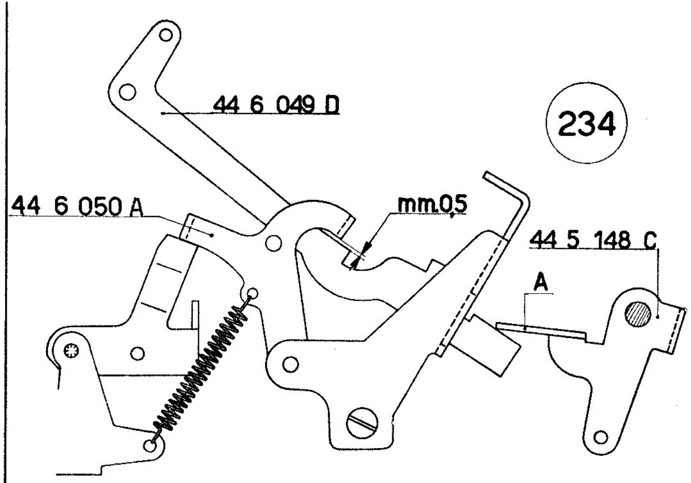
c) Depress all the way down the « memory reading » key and hold it in this position. Check the reading of 0.5 *mm. shown in the figure* 234. *Act if necessary on the wing* **A** *of the bridge* 44 5 148 C.

d) Depress the « non-add » key and move the control plate 44 4 105 Z *rearward.*

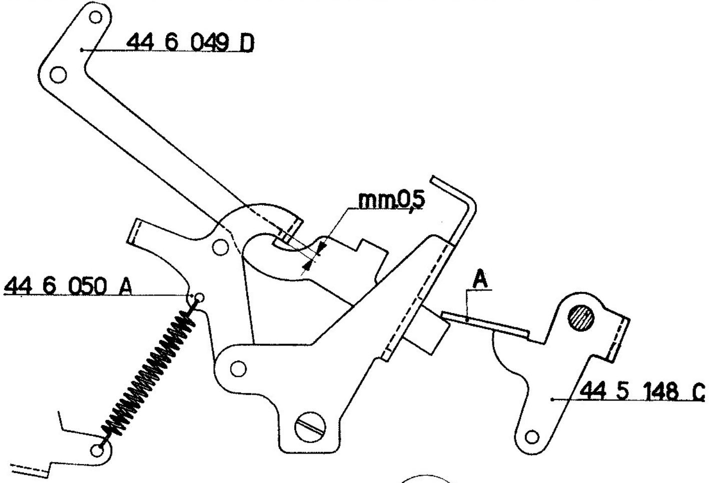
Check the reading of 0.5 *mm. shown in the figure* 235. *If the reading of* 0.5 *mm. is not exact check again the adjustment described at the point* c).

e) Make the main shaft do a full rotation. We should obtain the reading of 0.5 *mm. shown in the figure* 236. *Act if necessary on the wing* **B** *of the crank* 44 6 053 Z.

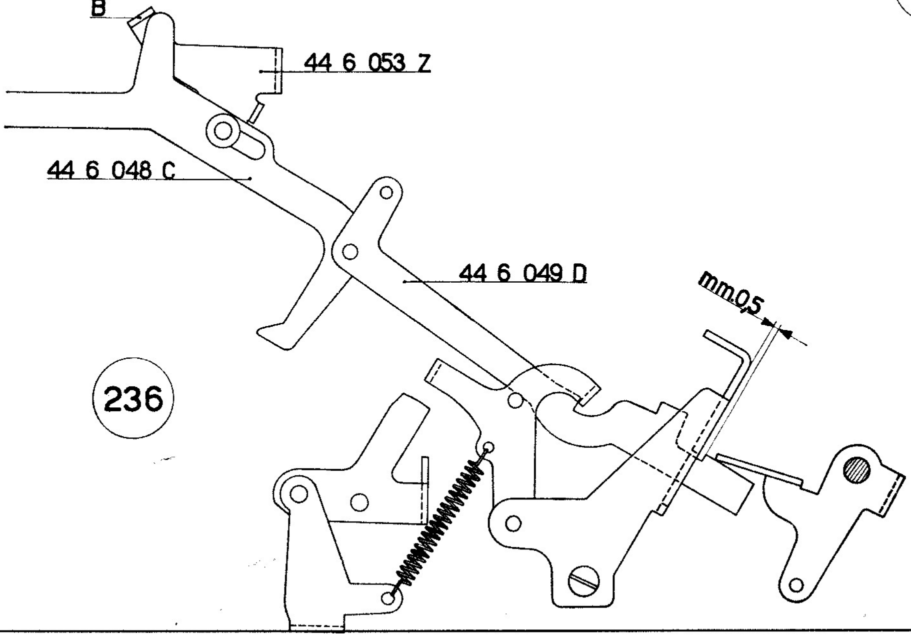
44 5 148 C	Memory connecting-rod and slider connection bridge
44 6 048 C	Memory engagement control connecting-rod
44 6 049 D	Memory engagement connecting-rod hook
44 6 050 A	Automatic quotient arm
44 6 053 Z	Memory engagement control connecting-rod control crank


234

44 6 049 D
44 6 050 A
mm0,5
44 5 148 C
A


235

44 6 049 D
mm0,5
44 6 050 A
A
44 5 148 C


236

B
44 6 053 Z
44 6 048 C
44 6 049 D
mm0,5

181 - FIGURE 237

Assembling the motor.

a) In the appropriate hole of the motor secure right home the pilot screw 44 8 022 U.

b) On the right internal side-plate of the machine locate the motor by inserting the pilot screw in the proper guide-hole. The worm **V** should be engaged with the wheel 43 4 144 M while the starting lever 43 8 012 Q must rest on the profile of the disc 43 4 450 U. Secure the motor by means of three screws 925 5 02 R which should not be tightened.

c) Move suitably the motor to reduce the play between the worm **V** *and the wheel* 43 4 144 M *to the minimum. Then tighten three screws* 999 0 17 Q.

44 8 022 U	Motor pilot screw
43 4 144 M	Helicoidal wheel for main shaft
43 4 450 U	Disc with starting plate and dragging tooth
43 8 012 Q	Starting contact lever

182 - FIGURE 238

Adjusting the adjustable contact lever.

With the main shaft at rest, the adjustable contact lever 43 8 014 J *should be at* 0.2 *mm. from the small arm* 43 8 016 L. *Act if necessary on the same lever* 43 8 014 J.

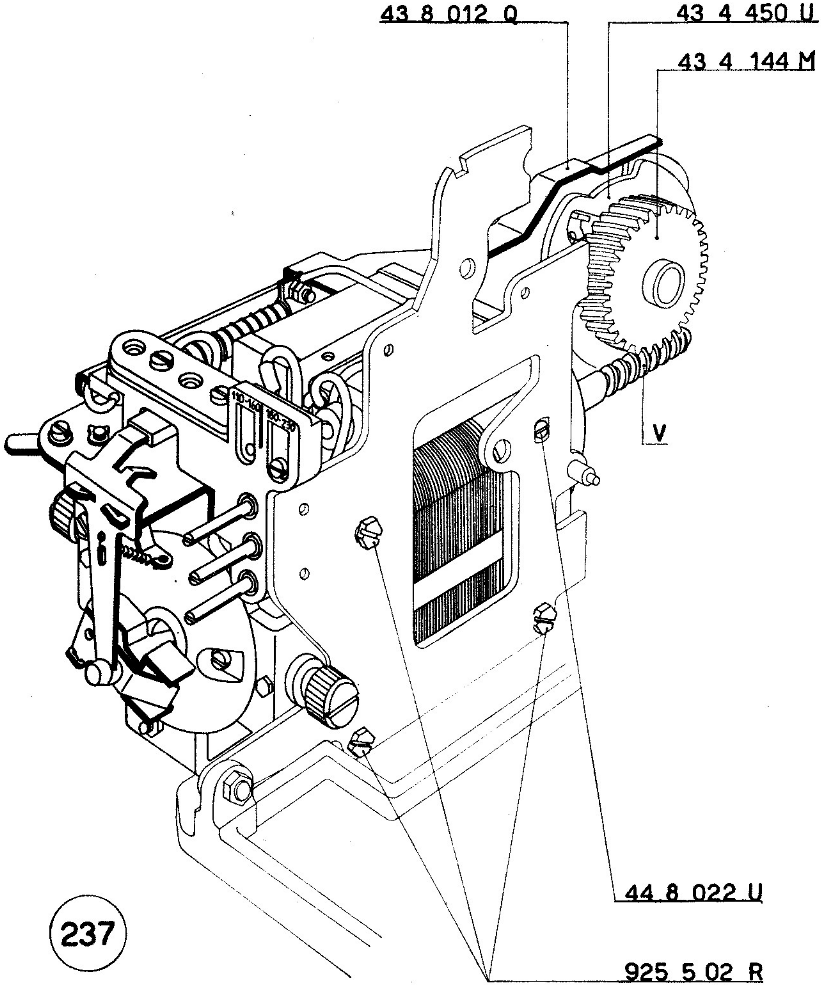
183 - FIGURE 239

Adjusting the starting contact lever.

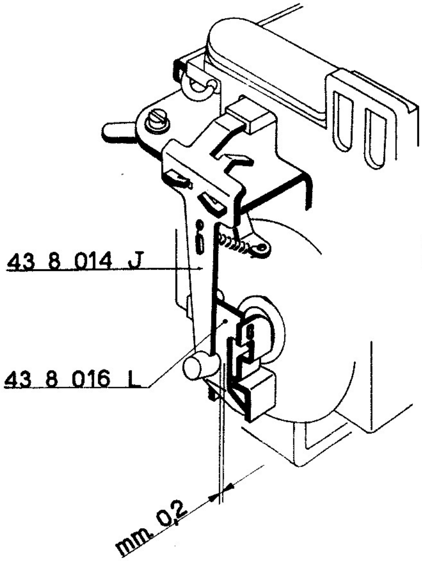
With the main shaft at rest, we should have the reading of 0.8÷1.2 *mm. shown in the figure. This is obtained by acting suitably on the lever* 43 8 012 Q.

N.B. — The features and the spare parts of the motors are listed at page 433 and followings.

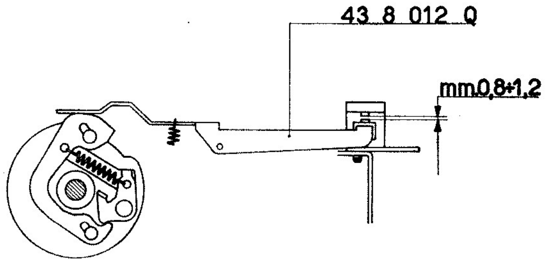
43 8 014 J	Adjustable contact lever
43 8 016 L	Adjustable arm
925 5 02 R	Motor setting screw


43 8 012 Q
43 4 450 U
43 4 144 M
V
110-160
180-230
44 8 022 U
925 5 02 R

237


43 8 014 J
43 8 016 L
mm 0,2

238


43 8 012 Q
mm0,8÷1,2

239

184 - FIGURE 240

Assembling the multiplier slide unit.

a) In the appropriate guide hole of the left external side-plate insert the shaft 44 5 020 T on which is to be placed the multiplier slide unit 44 5 619 C.

On the same shaft place the small slide shock-absorber 44 5 075 W. Place the shaft 44 5 020 T in the appropriate guide hole of the right internal side-plate; the shaft strikes against the motor (not designed in the figure).

b) Secure the shaft 44 5 020 T with a spring clip 945 3 41 A and then move the shock-absorber 44 5 075 W against the right internal side-plate of the machine.

185 - FIGURE 240

Assembling the small slide dragging comb and the multiplication stop control frame.

a) On the hub of the left arm 44 5 080 Y place the adjustable arm 44 5 041 U securing it with a screw 925 2 25 J which must not be tightened right home.

On the hub of the arm 44 5 080 Y screw the two screws 922 3 02 V.

b) In the appropriate guide holes of the right internal side-plate and of the left external side-plate inserted the shaft of the right arm 44 5 342 E.

Place on the same shaft:

— the small slide dragging comb 44 5 418 T

— the unit prepared at point *a*).

Adjust the axial position of the arm 44 5 041 U *to leave a little axial play to the shaft of the arm* 44 5 342 E.

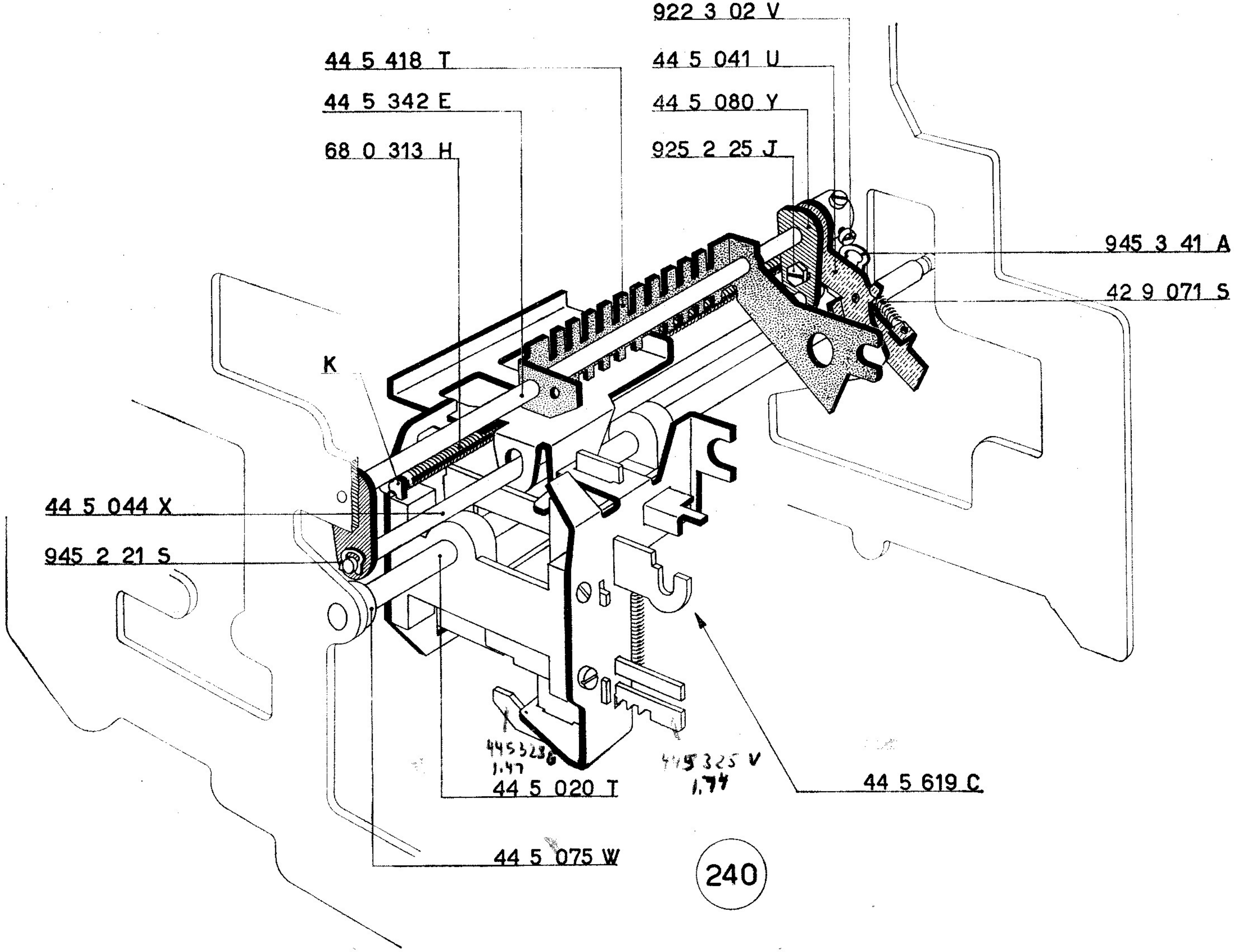
Tighten but not right home one of the screws 922 3 02 V.

c) Between the two arms 44 5 041 U and 44 5 342 E place correctly orientated the small shaft 44 5 044 X securing it with a spring-clip 945 2 21 S.

d) Between the fixed and the movable part of the adjustable arm 44 5 041 U, hook the spring 42 9 071 S.

e) Hook an end of the spring 68 0 313 H to the extension **K** of the small slides unit.

44 5 020 T	Small slides shaft
44 5 041 U	Adjustable arm for multiplication stop control frame
44 5 044 X	Multiplication stop control frame shaft
44 5 075 W	Slide shock-absorber
44 5 080 Y	Left arm of the multiplication stop control shaft
44 5 342 E	Right arm of the multiplication stop control shaft
44 5 418 T	Small slide dragging comb
44 5 619 C	Multiplier slide unit
42 9 071 S	Spring for 44 5 041 U
68 0 313 H	Slide spring
922 3 02 V	Screw for 44 5 080 Y
925 2 25 J	Screw for 44 5 041 U
945 2 21 S	Spring-clip
945 3 41 A	Spring-clip


922 3 02 V
44 5 418 T
44 5 041 U
44 5 342 E
44 5 080 Y
68 0 313 H
925 2 25 J
945 3 41 A
42 9 071 S
K
44 5 044 X
945 2 21 S
445323G
1.47
445325 V
1.74
44 5 020 T
44 5 619 C
44 5 075 W

240

186 - FIGURE 241

Assembling the stroke-counter control lever and the stop control arm.

a) On the shaft 44 5 342 E place the stroke-counter control lever 44 6 030 W and the stop control arm 44 5 435 L with the screws 920 3 02 F.

b) *Adjust the position of the arm* 44 5 435 L *to leave a little axial play to the lever* 44 6 030 W.

Tighten but not right home on of the screws 920 3 02 F.

c) Connect the rod of the arm 44 5 435 L to the arm 44 5 033 L securing it with a spring clip 945 2 21 S.

d) Hook the spring 68 0 313 H of the small slide unit to the appropriate hole of the left external side-plate.

187 - FIGURE 242

Assembling the multiplication calculation control frame.

a) In the guide hole of the left external side-plate insert the shaft 44 5 049 C on which should be placed:

— the calculation bar left arm 44 5 047 S with the screws 922 3 02 V

— the small slide dragging comb fork 44 5 418 T

— the ring 44 5 019 W in which groove must be placed the plate **P** of the multiplier small slide unit.

— the calculation bar right arm 44 5 048 B with the two screws 922 3 02 V.

b) *Adjust the position of the arm* 44 5 047 S *to leave a little axial play to the shaft* 44 5 049 C.

Tighten but not right home one of the screws of this arm.

c) Between the two arms 44 5 047 S and 44 5 048 B place the shaft 44 5 044 X on which should be located:

— the subtraction stop exclusion bridge 44 5 053 Y

— the fork of the rod **A** of the multiplier unit.

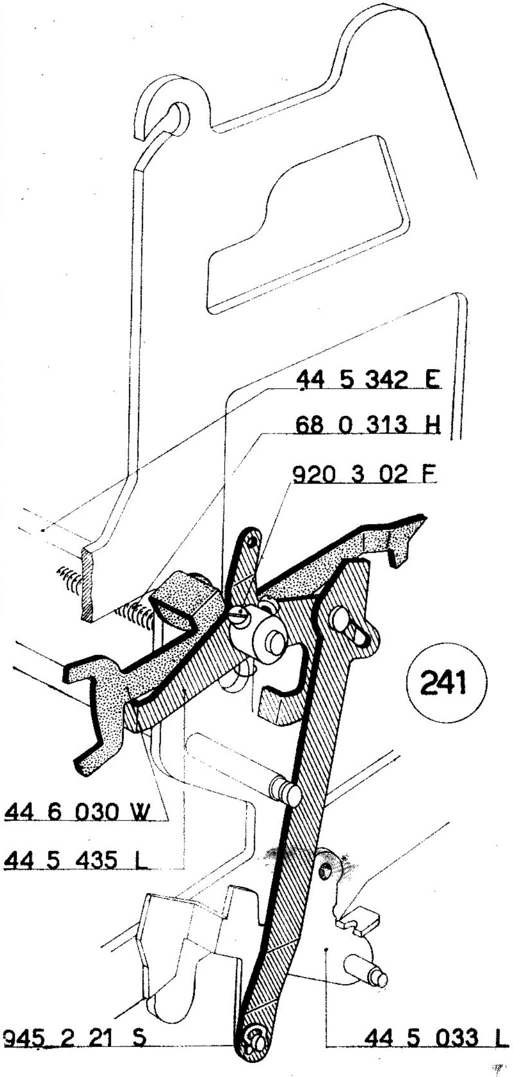
d) Secure the shaft 44 5 044 X by means of a spring clip 945 2 21 S.

e) *Adjust temporarily the position of the arm* 44 5 048 B *so that the shaft* 44 5 044 X *projects by* 1 *mm. about from the arm* 44 5 047 S, *not interfering therefore with the motor set-screw.*

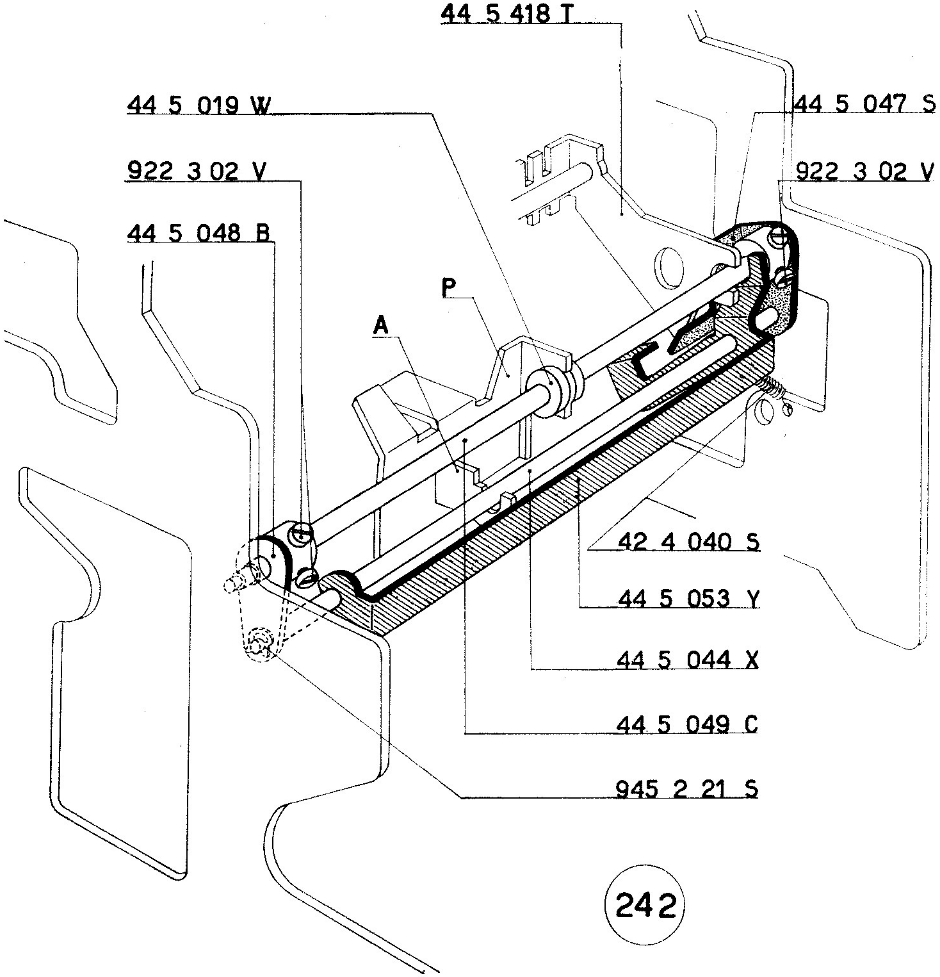
Tighten but not right home one of the screws of the arm 44 5 048 B.

f) Hook between the bridge 44 5 053 Y and the left external side-plate the spring 42 4 040 S.

44 5 019 W	Small slide guide rear ring
44 5 033 L	External arm for entry control plate frame
44 5 044 X	Shaft for multiplication stop control
44 5 047 S	Calculation bare left arm
44 5 048 B	Calculation bar right arm
44 5 049 C	Calculation bar shaft
44 5 053 Y	Subtraction stop exclusion bridge
44 5 342 E	Right arm of the multiplication stop control shaft
44 5 418 T	Small slide dragging comb
44 5 435 L	Stop control arm
44 6 030 W	Stroke-counter control lever
42 4 040 S	Spring for 44 5 053 Y
68 0 313 H	Spring for the multiplier slide unit
920 3 02 F	Screw for 44 5 435 L
922 3 02 V	Screws for 44 5 047 S and 44 5 048 B
945 2 21 S	Spring-clip


44 5 342 E
68 0 313 H
920 3 02 F
44 6 030 W
44 5 435 L
945 2 21 S
44 5 033 L

241


44 5 418 T
44 5 019 W
44 5 047 S
922 3 02 V
922 3 02 V
44 5 048 B
P
A
42 4 040 S
44 5 053 Y
44 5 044 X
44 5 049 C
945 2 21 S

242

188 - FIGURE 243

Assembling temporarily the side-plates connection support plate.

Between the right internal side-plate and the left external side-plate place the support plate 44 5 164 U securing it with four screws 920 3 02 F. In this way we determine the exact position of the two side-plates and it is possible to make the adjustments described in the two new paragraphs.

189 - Adjusting the multiplier stop control frame.

a) Adjust the axial position of the arm 44 5 080 Y *(figure* 240) *to leave a little axial play to the shaft* 44 5 342 E.

b) Adjust the angular position of the arm 44 5 080 Y *so that the shaft* 44 5 044 X *is perfectly parallel to the shaft* 44 5 342 E.

c) Once the two above conditions are obtained tighten the screws of the arm 44 5 080 Y.

190 - Adjusting the multiplication calculation control frame.

a) Adjust the axial position of the arm 44 5 047 S *(figure* 242) *to leave a little play to the shaft* 44 5 049 C. *Tighten the two screws of the arm.*

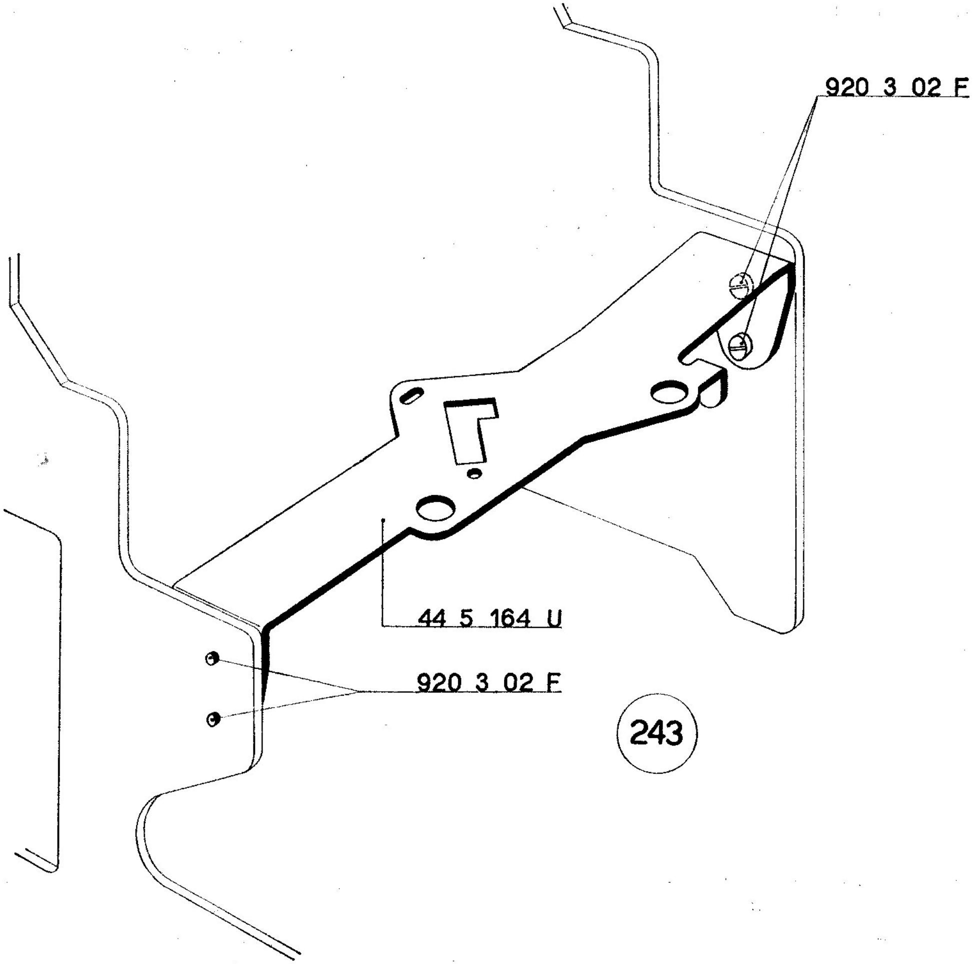
b) Adjust the angular and axial position of the arm 44 5 048 B *so that:*

— *the shaft* 44 5 044 X *is perfectly parallel to the shaft* 44 5 049 C

— *the shaft* 44 5 044 X *projects by* 1 *mm. about from the arm* 44 5 047 S *thus not interfering with the motor set-screw.*

Tighten the two screws of the arm 44 5 048 B.

44 5 164 U	Side-plates connection support plate
920 3 02 F	Set-screw for 44 5 164 U


920 3 02 F
44 5 164 U
920 3 02 F

243

191 - FIGURE 244

Adjusting the rest position of the multiplier stop control frame.

a) Move the main shaft to rest.

b) Loosen the screws of the arm 44 5 435 L *and rotate it thus moving the pivot* **K** *to contact the bottom of the upper slot of the rod* **H.**

Rotate the multiplier stop control frame so that its shaft 44 5 044 X *rests on the plate* **P** *of the multiplier small slide unit. When the reading of* 1 *mm. shown in the figure has been obtained tighten the screws of the arm* 44 5 435 L, *checking to have left a little axial play to the lever* 44 6 030 W.

44 5 044 X	Small shaft of the multiplication stop control
44 5 418 T	Small slide dragging comb
44 5 435 L	Stop control arm
44 6 021 R	Stroke-counter frame
44 6 022 J	Quotient slide

192 - FIGURE 245

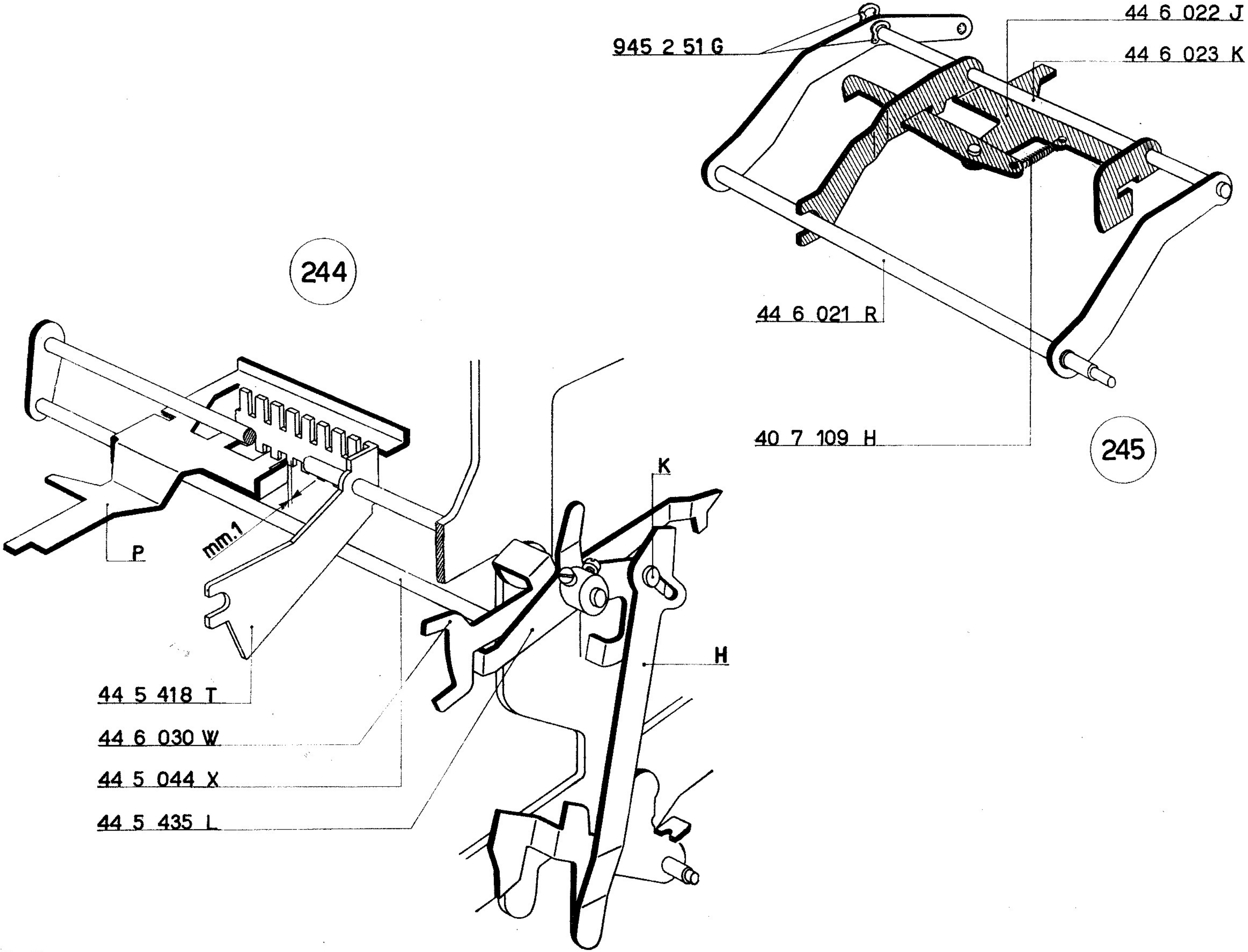
Preparing the division stroke-counter frame.

a) Between the small slide 44 6 022 J and the proper hook, hook the spring 40 7 109 H.

b) Between the guide holes of the stroke-counter frame 44 6 021 R place the shaft 44 6 023 K on which must be placed the small slide 44 6 022 J. The front slot of the small slide should be guided by the shaft of the frame.

Secure the shaft 44 6 023 K by means of two spring-clips 945 2 51 G.

44 6 023 K	Small shaft of the quotient slide
44 6 030 W	Stroke-counter control lever
40 7 109 H	Spring for 44 6 022 J
945 2 51 G	Spring-clip


945 2 51 G
44 6 022 J
44 6 023 K
44 6 021 R
40 7 109 H
K
H
P
mm.1
44 5 418 T
44 6 030 W
44 5 044 X
44 5 435 L

244

245

193 - FIGURES 246 and 247

Assembling the division stroke-counter frame; the arm with stroke-counter control shaft; the small slide restoring bridge and the connecting-rod with division sign.

a) Between the right internal side-plate and the left external side-plate, place the division stroke-counter frame 44 6 021 R prepared in the precedent paragraph.

b) In the hole of the ring 44 6 035 P insert the shaft of the stroke-counter control arm 44 6 017 M on which must be successively located:

— the crank 44 6 018 W with the screw 922 3 02 V

— the partial restoring and printing control hook 44 6 037 R (assembled precedently)

— a second crank 44 6 018 W and the two screws 922 3 02 V. Make the shaft of the arm 44 6 017 M projects from the guide hole of the right internal side-plate and secure it by means of a spring clip 945 2 51 G.

c) Pivot the stroke-counter frame 44 6 021 R on the two cranks 44 6 018 W. At the right assemble and pivot the connecting-rod with division sign 44 6 036 Q. This latter should be inserted in the appropriate guide slot of the comb 44 3 014 P.

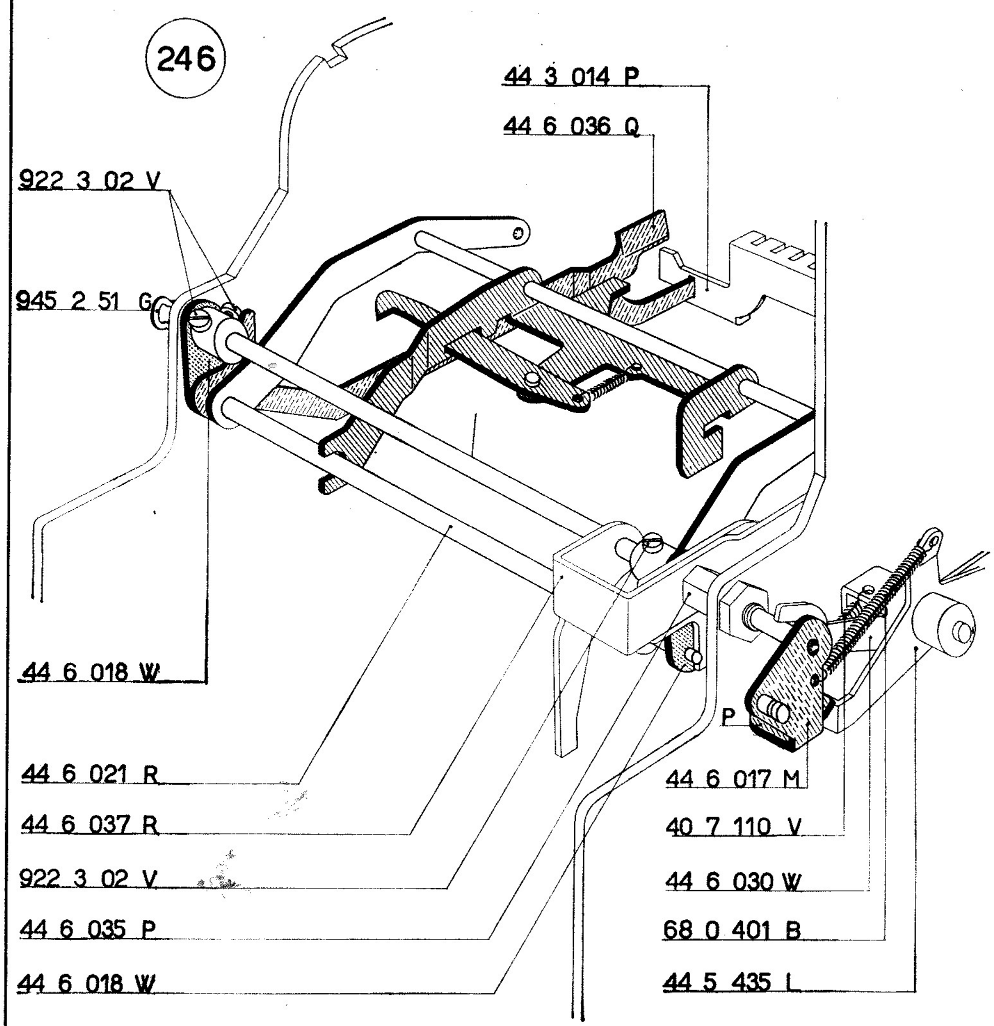
d) Connect the connecting-rod **B** of the frame 44 5 062 Z (figure 247) to the right arm of the frame 44 6 021 R. Secure it with a spring-clip 945 2 21 S.

e) Hook the spring 40 7 110 V between the bent **P** of the arm 44 6 017 M and the connecting-rod 44 6 030 W.

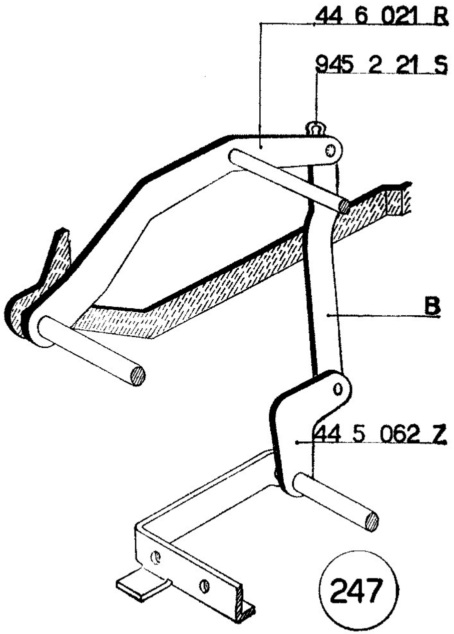
f) Hook the spring 68 0 401 B between the arm 44 6 017 M and the arm 44 5 435 L.

44 3 014 P	Racks guide rear comb
44 5 062 Z	Stroke-counter frame
44 5 435 L	Stop control arm
44 6 017 M	Arm with stoke-counter control shaft
44 6 018 W	Stroke-counter clutch frame crank
44 6 021 R	Stroke-counter frame
44 6 030 W	Stroke-counter control lever
44 6 035 P	Division connecting-rod guide ring
44 6 036 Q	Connecting-rod with division sign
44 6 037 R	Partial restoring and printing control hook
40 7 110 V	Spring for 44 6 017 M - 44 6 030 W
68 0 401 B	Spring for 44 6 017 M - 44 5 435 L
922 3 02 V	Screw for 44 6 018 W
945 2 21 S	Spring-clip
945 2 51 G	Spring-clip

246


44 3 014 P
44 6 036 Q
922 3 02 V
945 2 51 G
44 6 018 W
44 6 021 R
44 6 037 R
922 3 02 V
44 6 035 P
44 6 018 W
P
44 6 017 M
40 7 110 V
44 6 030 W
68 0 401 B
44 5 435 L

247


44 6 021 R
945 2 21 S
B
44 5 062 Z

194 - FIGURES 248 and 249

Assembling the small racks clearing frame.

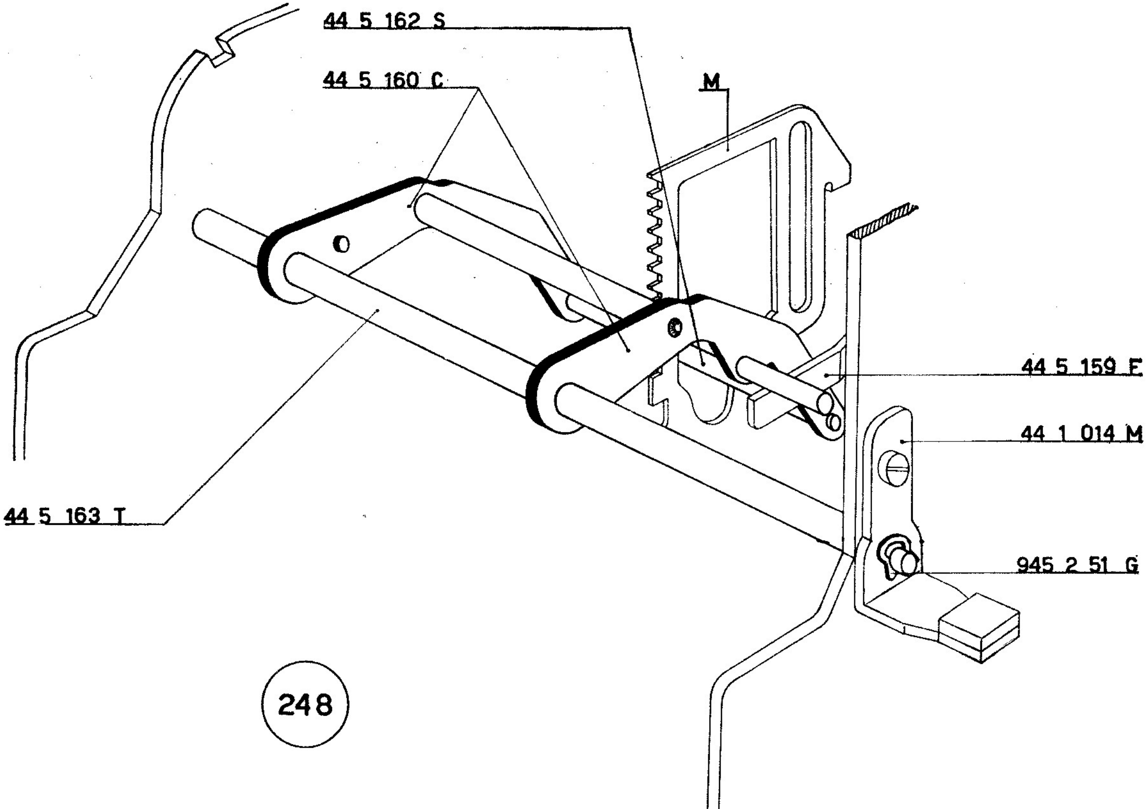
a) In the appropriate opening of the twelve small racks **M** of the memory unit place the small shaft 44 5 162 S.

b) Assemble the small racks clearing frame 44 5 160 C; in the holes of its arms pivot the shaft 44 5 162 S.

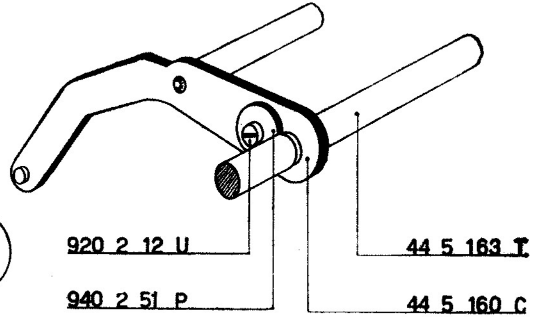
c) In the appropriate guide hole of the right internal side-plate of the machine insert the shaft 44 5 163 T on which should be placed the frame 44 5 160 C. Make the shaft projects from the hole of the left support of the casing 44 1 014 M and secure it with a spring clip 945 2 51 G. Tighten the screw securing the support.

d) Secure the frame 44 5 160 C to the shaft 44 5 163 T by means of a washer 940 2 51 P and the screw 920 2 12 U (figure 249).

44 1 014 M	Left support of the casing
44 5 159 F	Small racks clearing control lever
44 5 160 C	Small racks clearing frame
44 5 162 S	Small racks clearing shaft
920 2 12 U	Screw for 940 2 51 P
940 2 51 P	Washer
945 2 51 G	Spring-clip


44 5 162 S
44 5 160 C
M
44 5 159 F
44 1 014 M
44 5 163 T
945 2 51 G

248


920 2 12 U
940 2 51 P
44 5 163 T
44 5 160 C

249

195 - FIGURE 250

Adjusting the stroke-counter control arm.

a) Move the main shaft of the machine to rest.

b) Rotate the bridge 44 6 026 N *so that the connecting-rod* 44 6 334 X *is actuated forward and stops against the bridge* 44 5 417 J.

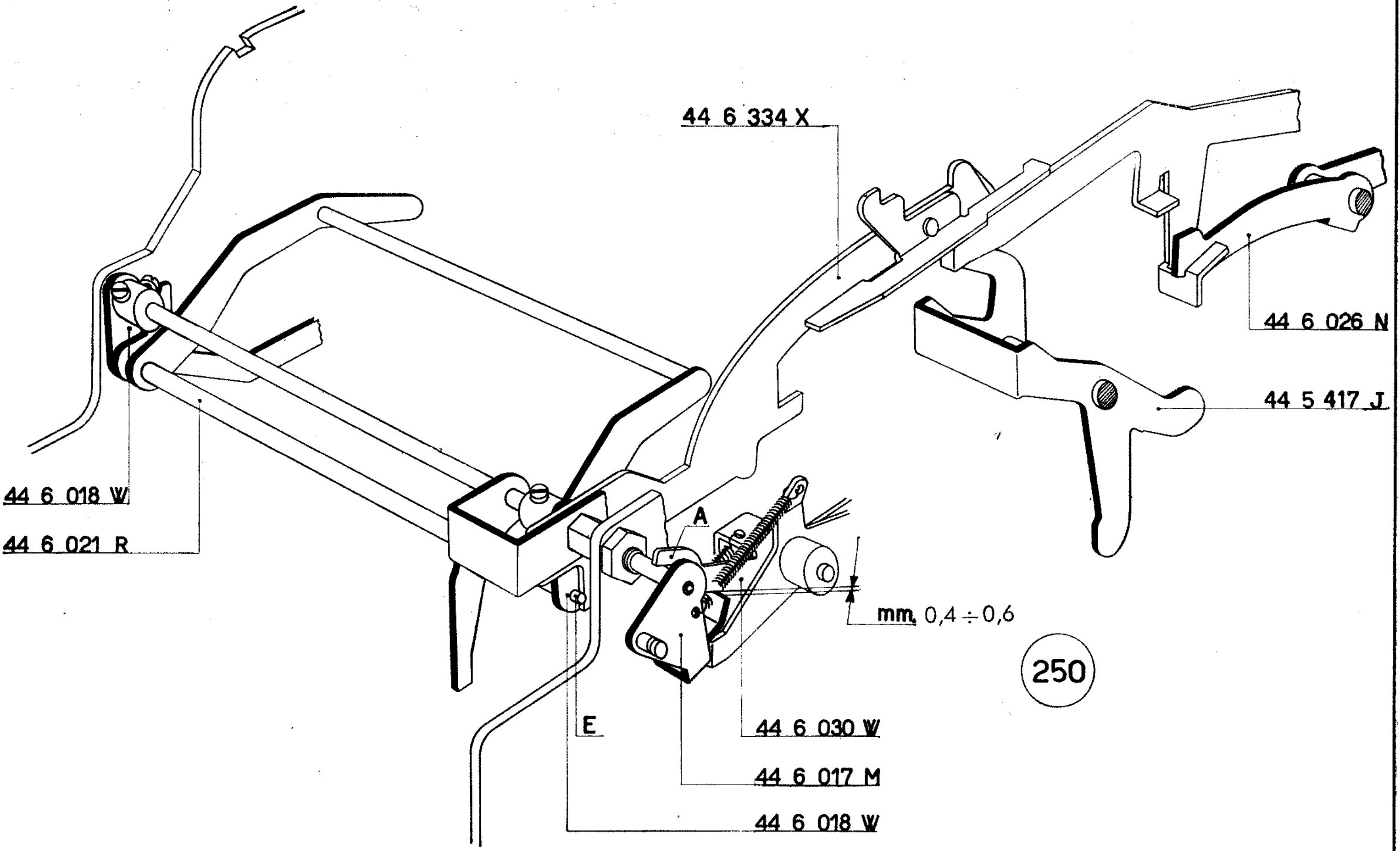
c) Move the extension **A** *of the lever* 44 6 030 W *to contact the shaft of the arm* 44 6 017 M. *Adjust the angular position of this latter to obtain the clearance of* 0.4÷0.6 *mm. shown in the figure.*

In this position adjust the angular position of the crank 44 6 018 W *(left) thus moving the end* **R** *of the shaft of the frame* 44 6 021 T *to contact the connecting-rod* 44 6 334 X.

d) Adjust the axial position of the crank 44 6 018 W *(right) to leave an axial play of* 0.2 *mm. to the shaft of the frame* 44 6 021 R; *adjust also its angular position so that the shaft of the frame* 44 6 021 R *is perfectly parallel to the shaft of the arm* 44 6 017 M.

e) Move the connecting-rod back to rest 44 6 334 X.

44 5 417 J	Multiplication tester and division connecting-rod control bridge
44 6 017 M	Arm with stroke-counter control shaft
44 6 018 W	Stroke-counter clutch frame crank
44 6 021 R	Stroke-counter frame
44 6 026 N	Division connecting-rod release bridge
44 6 030 W	Stroke-counter control lever
44 6 334 X	Division connecting-rod with stop pawl


44 6 334 X
44 6 026 N
44 5 417 J
44 6 018 W
44 6 021 R
A
mm 0,4 ÷ 0,6
250
E
44 6 030 W
44 6 017 M
44 6 018 W

196 - FIGURES 251 and 252

Adjusting the small racks clearing.

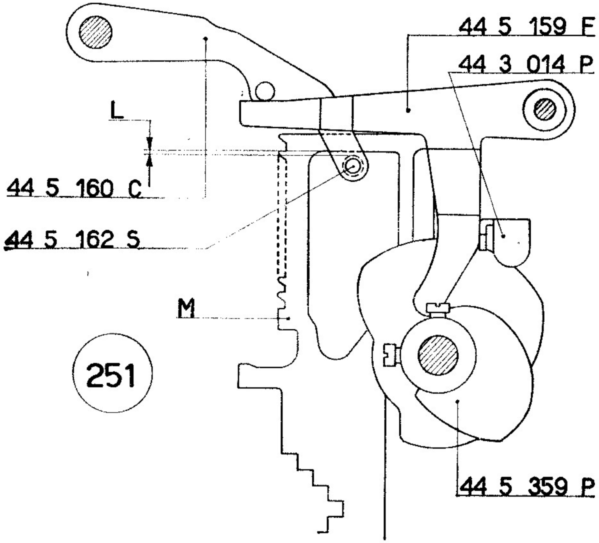
a) Lower completely (that is to « 9 ») the small racks **M** *of the memory unit. Between the shaft* 44 5 162 S *and the small racks there should be a little clearance* **L** *(figure 251).*

b) Depress the key « **X** » *and rotate the main shaft until moving the cam* 44 5 359 P *to the position illustrated in the figure 252. The small racks* **M** *are consequently moved to* « 0 ».

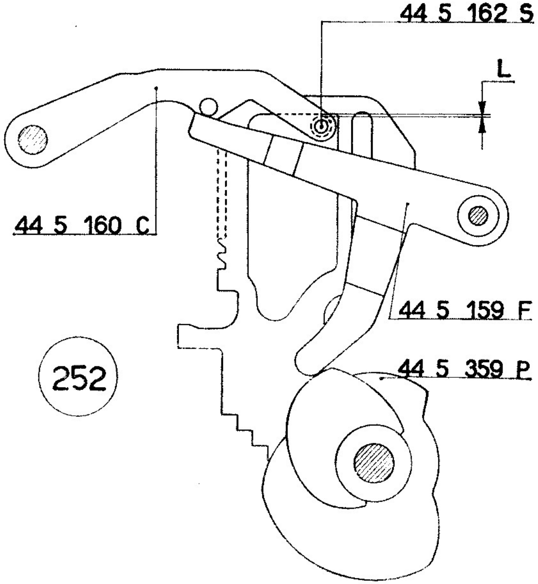
Between the shaft 44 5 162 S *and the small racks* **M** *still observe a little clearance* **L**.

c) The two above conditions are obtained by acting suitably on the rear arm of the lever 44 5 159 F. *This operation must be done when the lever* 44 5 159 F *rests on the cam and not on the comb* 44 3 014 P.

44 3 014 P	Racks guide rear comb
44 5 159 F	Small racks clearing control lever
44 5 160 C	Small racks clearing frame
44 5 162 S	Small racks clearing shaft
44 5 359 P	Small racks clearing control cam


44 5 159 F
44 3 014 P
L
44 5 160 C
44 5 162 S
M
44 5 359 P

251


44 5 162 S
L
44 5 160 C
44 5 159 F
44 5 359 P

252

197 - FIGURES 253 and 254

Assembling the stroke-counter testing hook-lever control bridge and the arm holding plate control stabilizer.

a) Assemble by means of the shaft 44 5 055 S:

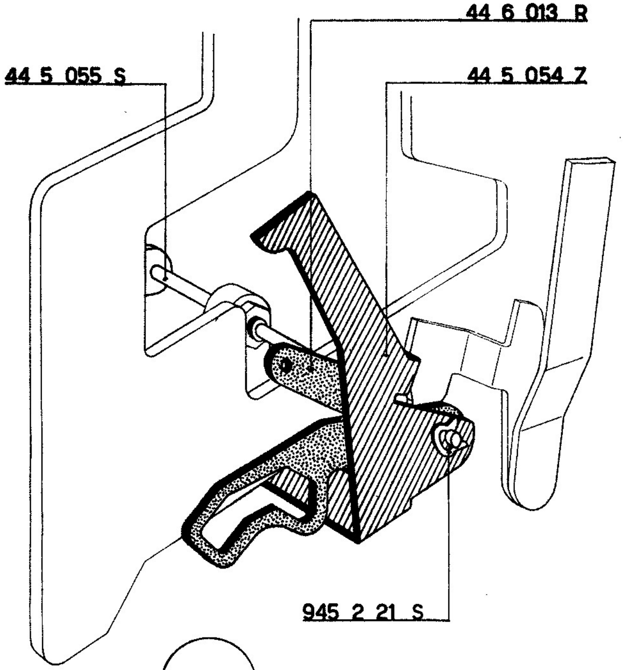
— the stroke-counter testing hook-lever control bridge 44 5 054 Z

— the arm holding plate control stabilizer 44 6 013 R which should take the position illustrated in the two figures. The pivot **P** of the bridge 44 5 054 Z must be located in the opening of the lever 44 5 057 U.

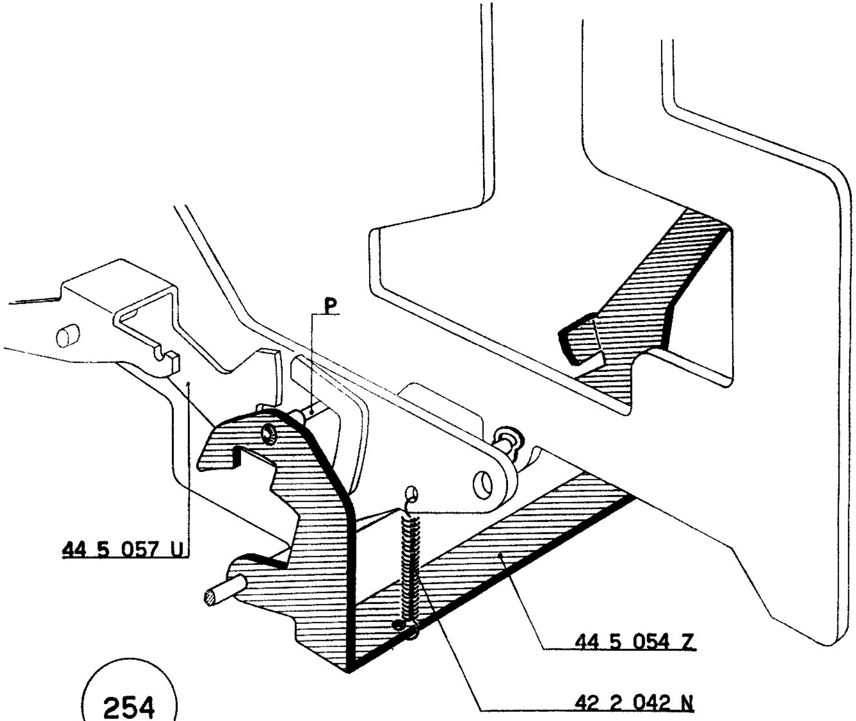
b) Secure the shaft 44 5 055 S by means of two spring clips 945 2 21 S.

c) Hook the spring 42 2 042 N between the bridge 44 5 054 Z and the left internal side-plate of the machine.

44 5 054 Z	Stroke-counter testing hook-lever control bridge
44 5 055 S	Hook-lever control bridge supporting shaft
44 5 057 U	Stroke-counter testing hook-lever
44 6 013 R	Arm holding plate control stabilizer
42 2 042 N	Spring for 44 5 054 Z
945 2 21 S	Spring-clip


44 6 013 R
44 5 055 S
44 5 054 Z
945 2 21 S

253


P
44 5 057 U
44 5 054 Z
42 2 042 N

254

198 - FIGURE 255

Preparing the arm holding plate control arm.

a) On each one of the two pawls 44 6 009 E place a small pin 44 6 010 S.

Check that they are free to rotate and have a minimum axial play.

b) On the arm 44 6 008 D assemble the two pawls now prepared securing them by means of the stud-screw 926 3 01 Y and nut 938 3 05 G.

c) Between the two pawls 44 6 009 E, hook the spring 68 0 510 B.

d) On the hub of the arm 44 6 008 D screw the two screws 922 3 02 V and 40 2 072 Z.

44 6 008 D	Arm holding plate control arm
44 6 009 E	Slide stop arm guide plate dragging pawl
44 6 010 S	Pin for 44 6 009 E
44 6 011 P	Arm holding plate control lever
44 6 013 R	Arm holding plate control stabilizer
40 2 072 Z	Screw for 44 6 008 D

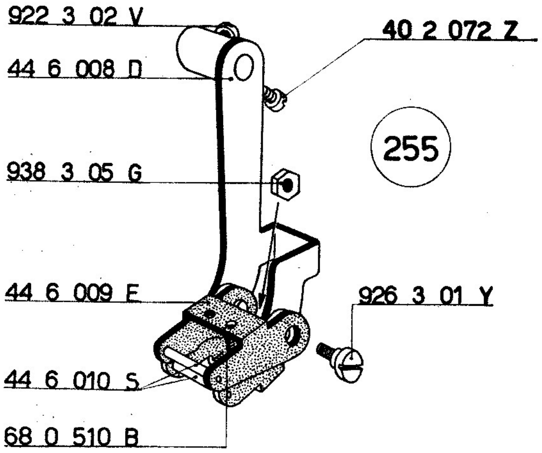
199 - FIGURES 256 an 257

Assembling the arm holding plate control arm and lever.

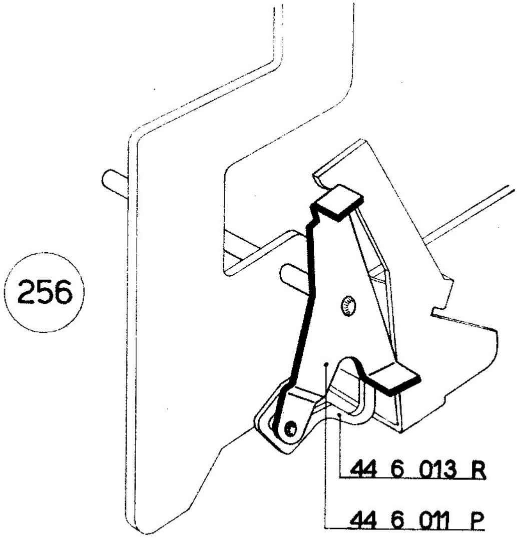
a) In the appropriate guide hole of the left external side-plate insert the shaft of the lever 44 6 011 P. Its roller should be placed in the slot of the stabilizer 44 6 013 R (figure 256).

b) On the shaft of the lever 44 6 011 P assemble the arm 44 6 008 D prepared in the precedent paragraph. Secure the shaft means of two spring-clips 945 3 41 A (figure 257).

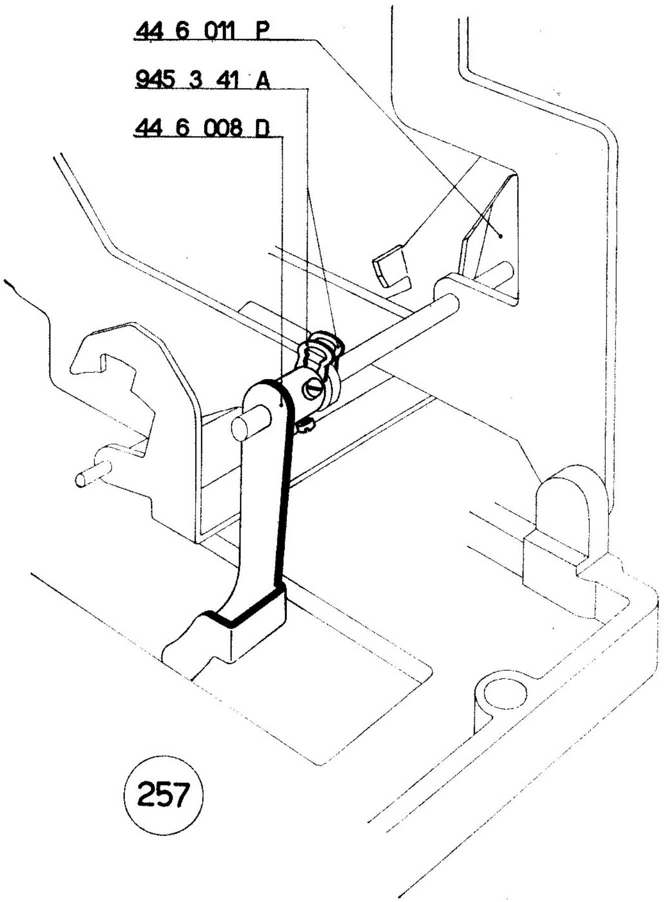
68 0 510 B	Spring for 44 6 009 E
922 3 02 V	Screw for 44 6 008 D
926 3 01 Y	Stud-pivot for 44 6 009 E
938 3 05 G	Nut for 926 3 01 Y
945 3 41 A	Spring-clip


255

922 3 02 V
44 6 008 D
40 2 072 Z
938 3 05 G
44 6 009 E
926 3 01 Y
44 6 010 S
68 0 510 B


256

44 6 013 R
44 6 011 P


257

44 6 011 P
945 3 41 A
44 6 008 D

200 - FIGURE 258

Assembling the automatic tabulation slide stop arm and plate.

a) In the two appropriate guide slots of the plate 44 6 001 W place the arm 44 6 002 X.

b) Between the hook **G** of the plate 44 6 001 W and the hole **F** of the arm 44 6 002 X, hook the spring 68 0 328Q.

c) On the base of the machine place, as illustrated in the figure, the plate 44 6 001 W. See above all that:

— its rear end is engaged with the two pawls 44 6 009 E

— the arm 44 6 002 X rests on the pivot **P** of the bridge 44 6 004 Z.

Secure the plate by means of the two stud-screws 926 3 91 J and special screw 44 1 062 V.

201 - FIGURE 258

Assembling the negative and positive multiplication symbol racks stop connecting-rod.

a) Between the pivot of the transmission lever 44 5 099 X and the pivot **P1** of the plate 43 2 075 R place the connecting-rod 44 5 068 F. Secure it to the lever 44 5 099 X by means of a spring clip 945 2 21 S.

b) Between the lever 44 5 068 F and the right external side-plate of the machine hook the spring 68 1 215 U.

202 - FIGURES 258 and 259

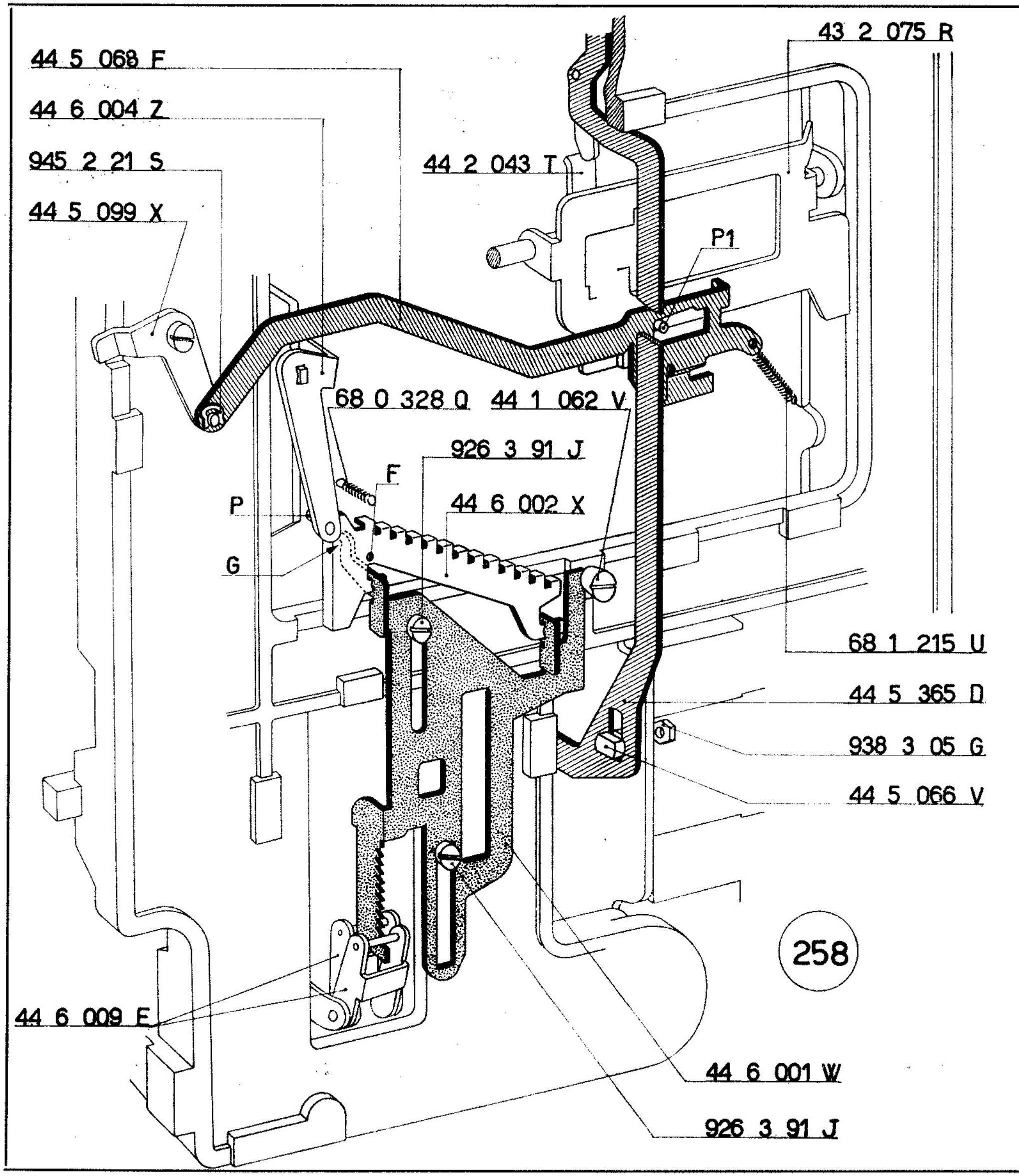
Assembling the escapement control stay.

a) Between the stay 44 5 365 D and the small plate **C**, hook the spring 68 0 412 V (figure 259).

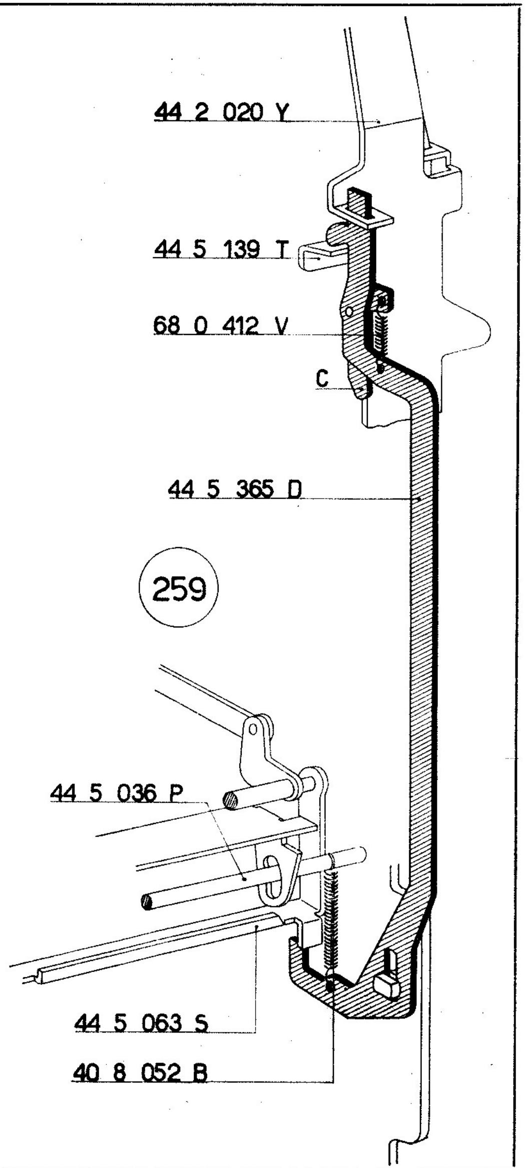
b) Place on the machine as illustrated in the two figures, the stay 44 5 365 D. Secure it to the right internal side-plate of the machine by means of the pivot 44 5 066 V and the nut 938 3 05 G.

c) Between the stay 44 5 365 D and the shaft 44 5 036 P, hook the spring 40 8 052 B.

44 1 062 V	Special screw
44 2 320 H	Lower connection stay
44 2 043 T	Slide escapement fixed dog
44 5 036 P	Entry control plate rear shaft
44 5 063 S	Stroke-counter bridge
44 5 066 V	Pivot for 44 5 365 D
44 5 068 F	Negative and positive multiplication symbol racks stop connecting-rod
44 5 099 X	Multiplication signs control transmission lever
44 5 139 T	Cypher plate
44 5 365 D	Escapement control stay
44 6 001 W	Slide stop arm holding plate
44 6 002 X	Automatic tabulation slide stop arm
44 6 004 Z	Current release bridge
44 6 009 E	Slide stop arm guide plate dragging pawl
43 2 075 R	Slide guide and escapement plate
40 8 052 B	Spring for 44 5 365 D
68 0 328 Q	Spring for 44 6 002 X
68 0 412 V	Spring for 44 5 365 D
68 0 412 V	Spring for 44 5 068 F
68 1 215 U	Stud-screw for 44 6 001 W
926 3 05 G	Nut for 44 5 066 V
945 2 21 S	Spring-clip


44 5 068 F
44 6 004 Z
945 2 21 S
44 5 099 X
44 2 043 T
43 2 075 R
P1
68 0 328 Q
44 1 062 V
926 3 91 J
F
44 6 002 X
P
G
68 1 215 U
44 5 365 D
938 3 05 G
44 5 066 V
44 6 009 E
44 6 001 W
926 3 91 J

258


44 2 020 Y
44 5 139 T
68 0 412 V
C
44 5 365 D
44 5 036 P
44 5 063 S
40 8 052 B

259

203 - FIGURES 260 and 261

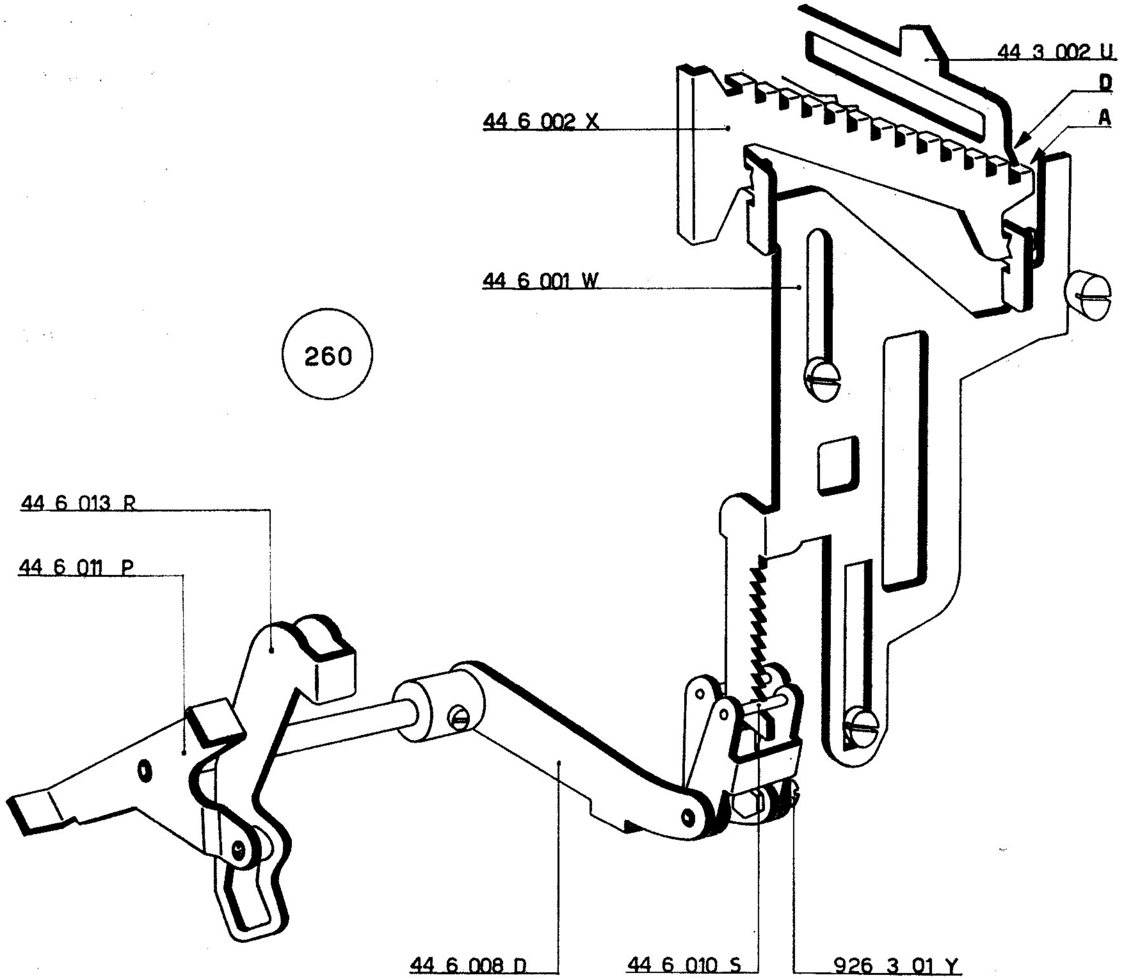
Adjusting the arm holding plate control arm.

a) Adjust the axial position of the arm 44 6 008 D *so that the pin* 44 6 010 S *is perfectly centered with respect to the teeth-range of the plate* 44 6 001 W. *Check that the stud-screw* 926 3 01 Y *don't strike against the plate* 44 6 001 W.

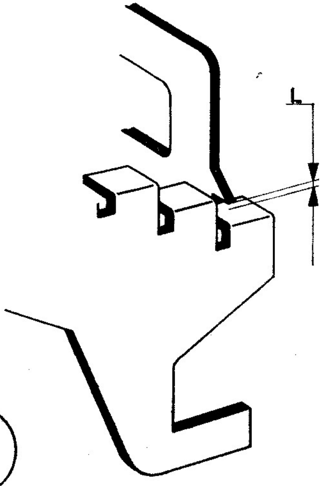
b) Move the roller of the lever 44 6 011 P *to the bottom of the front slot of the stabilizer* 44 6 013 R. *The pin* 44 6 010 S *should be in the last opening of the teeth-range of the plate* 44 6 001 W.

In this condition adjust the angular position of the arm 44 6 008 D *so that the stop* **A** *of the arm* 44 6 002 X *has a very little play* **L** *with respect to the tooth* **D** *of the third rack* 44 3 002 D *(see figure* 261 *for better understanding).*

44 3 002 U	Main rack
44 6 001 W	Slide stop arm holding plate
44 6 002 X	Automatic tabulation slide stop arm
44 6 008 D	Arm holding plate control arm
44 6 010 S	Pin for 44 6 009 E
44 6 011 P	Arm holding plate control lever
44 6 013 R	Arm holding plate control stabilizer
926 3 01 Y	Stud-screw


44 3 002 U
D
A
44 6 002 X
44 6 001 W
44 6 013 R
44 6 011 P
44 6 008 D
44 6 010 S
926 3 01 Y

260


L

261

204 - FIGURES 262 and 263

Adjusting the arm stop plate.

a) Move the main shaft of the machine to rest.

b) Clear the second register.

c) Enter twelve 9 *and add them in the second register.*

d) Depress the subtotal key and rotate the main shaft by about 90°.

Rotate the arm 44 6 008 D *forward; the stop* **A** *of the arm* 44 6 002 X *should pass with a clearance of* 0.2÷0.4 *mm. (figure* 262) *with respect to the small plate* 44 6 003 Y. *Act if necessary on the arm* **B** *of the plate* 44 6 001 W.

e) Complete the cycle of the main shaft.

f) Enter other twelve 9 *and add them in the second register.*

g) Depress a second register total key and rotate the main shaft by about 90°.

h) Rotate the lever 44 6 011 P *forward; the stop* **A** *of the arm* 44 6 002 K *should be interferred by the plate* 44 6 003 Y.

i) By still rotating the lever, the two stabilizers 44 6 009 E *should trip and move to the position illustrated in the figure* 263 *where the pins are placed in the last opening of the small rack.*

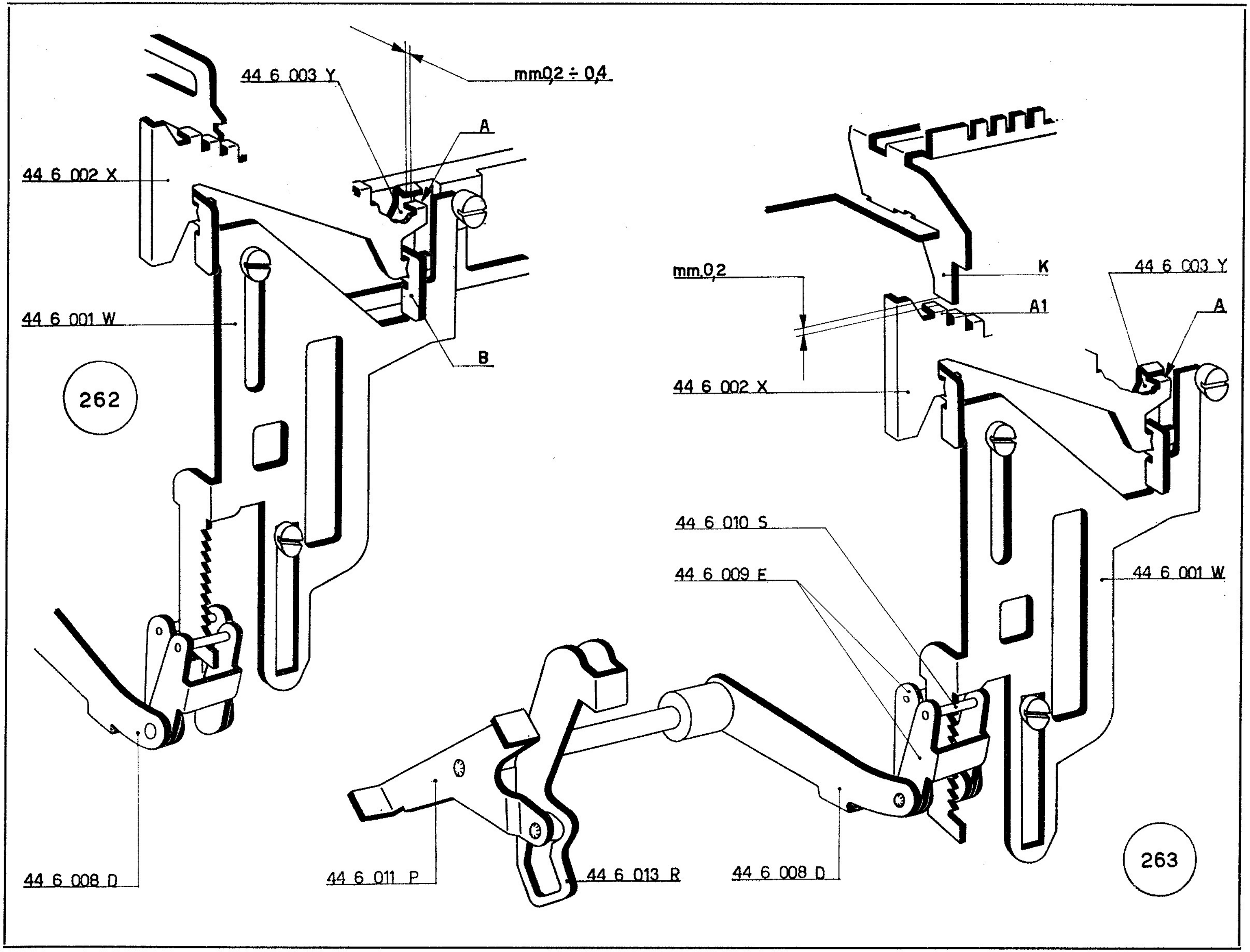
l) Complete the cycle.

m) Rotate the escapement movable dog to release the slide which will make the full travel leftward. In these conditions we should have the clearance of 0.2 *mm. between the arm* **K** *and the stop* **A1** *of the arm* 44 6 002 X.

n) The conditions at point i) *and at point* m) *are obtained by moving suitably the small plate* 44 6 003 Y.

44 6 001 W	Slide stop arm holding plate
44 6 002 X	Automatic tabulation slide stop arm
44 6 003 Y	Arm stop plate
44 6 008 D	Arm holding plate control arm

44 6 009 E	Slide stop arm guide plate dragging pawl
44 6 010 S	Pin for 44 6 009 E
44 6 011 P	Arm holding plate control lever
44 6 013 R	Arm holding plate control stabilizer


44 6 003 Y
mm0,2 ÷ 0,4
A
44 6 002 X
44 6 001 W
B
44 6 008 D
K
44 6 003 Y
mm 0,2
A1
A
44 6 002 X
44 6 010 S
44 6 009 E
44 6 001 W
44 6 011 P
44 6 013 R
44 6 008 D

262

263

205 - FIGURES 264 and 265

Assembling the small slide restoring first transmission lever ; the entry control plate, control upper and lower arm.

a) In the appropriate hole of the base insert the shaft of the small slide restoring first transmission lever 44 5 140 G ; secure it with a spring clip 945 3 41 A (not visible in the figure 264).

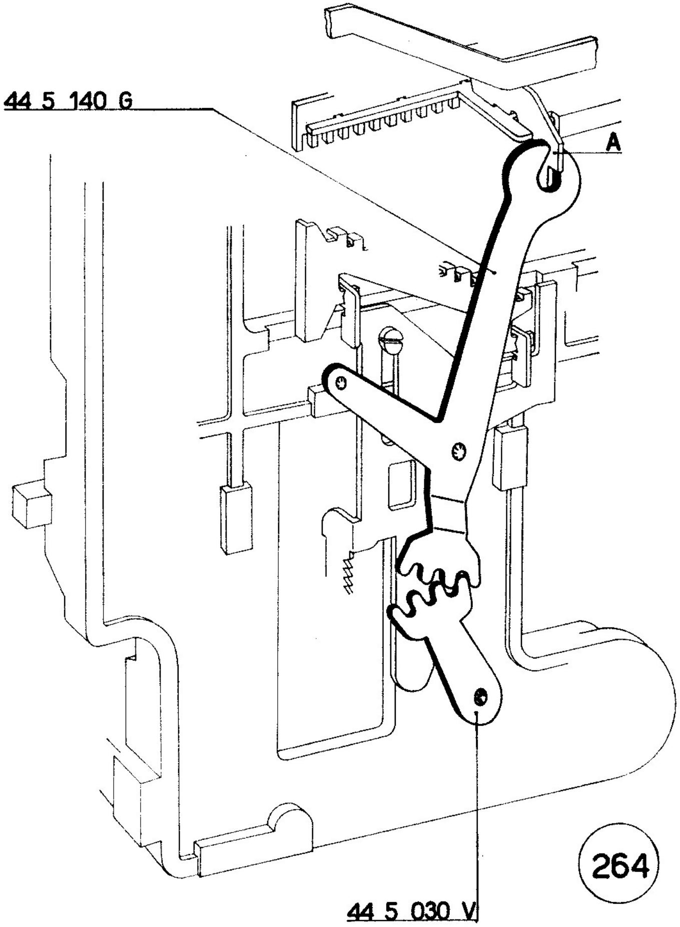
b) In the appropriate hole of the base insert the shaft of the entry control plate control lower arm 44 5 030 W (figure 265). Place on it the upper arm 44 5 029 Y with the two screws 922 3 02 V (figure 265).

c) Check the adjustment between the lever 44 5 140 G *and the arm* 44 5 030 V *which should be that illustrated in the figure* 264.

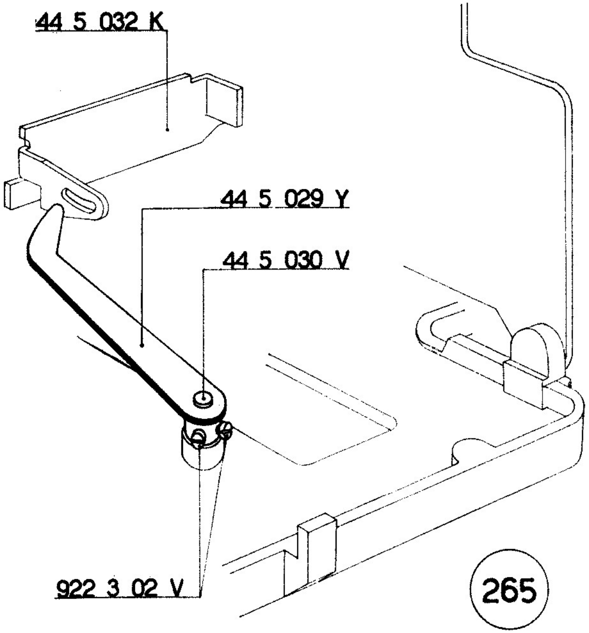
d) Adjust the axial position of the arm 44 5 029 Y *to leave a little play to the arm* 44 5 030 V.

Tighten but not right home one of the screws of the arm 44 5 029 Y.

44 5 029 Y	Entry control plate control upper arm
44 5 030 V	Entry control plate control lower arm
44 5 032 K	Entry control plate
44 5 140 G	Small slide restoring first transmission lever
922 3 02 V	Screws for 44 5 029 Y
945 3 41 A	Spring-clip


44 5 140 G
A
44 5 030 V

264


44 5 032 K
44 5 029 Y
44 5 030 V
922 3 02 V

265

206 - FIGURES 266 and 267

Adjusting the entry control plate control upper arm.

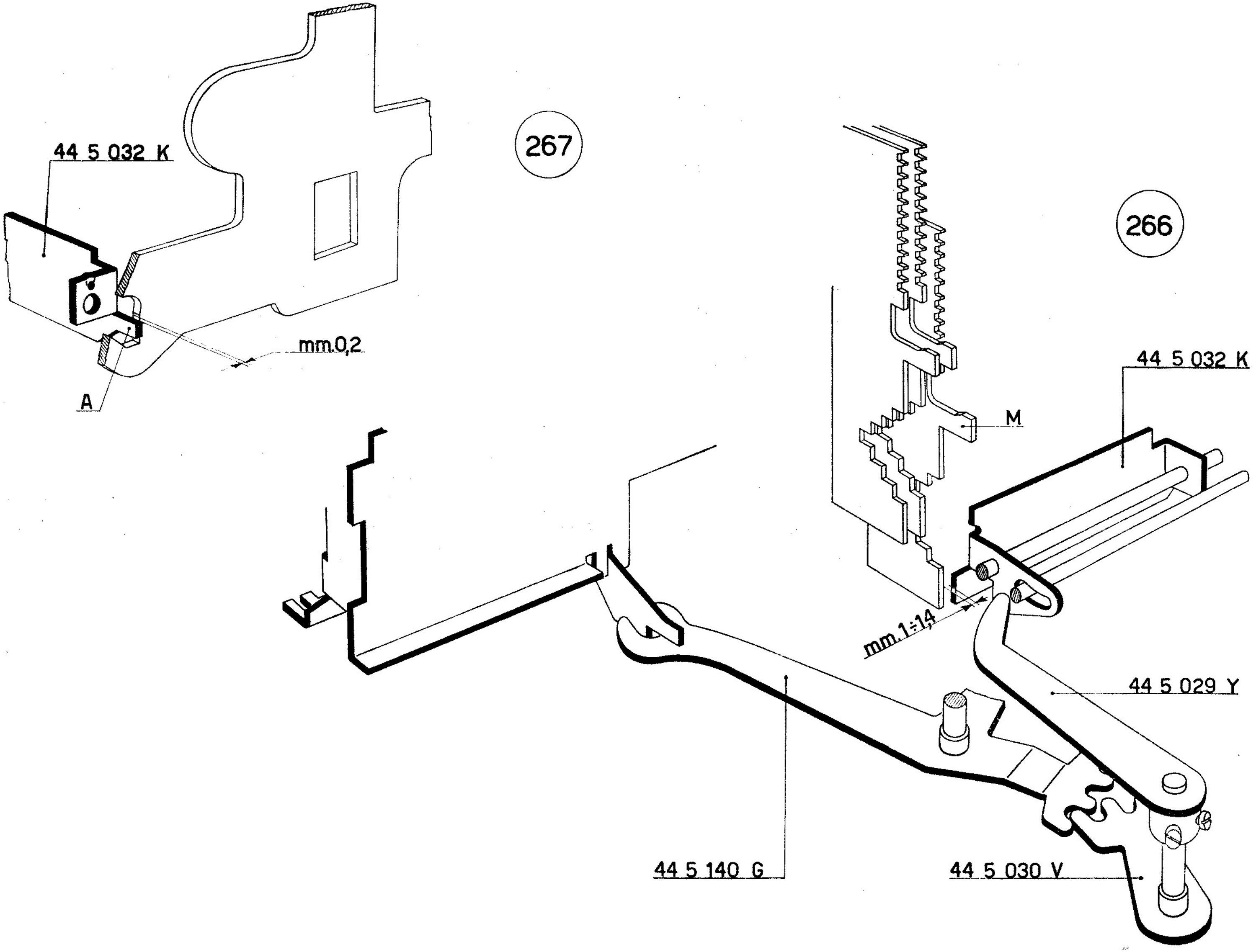
a) Move the main shaft and the slide to rest.

b) Lower, as illustrated in the figure, the first small rack **M** *of the memory unit.*

c) Adjust the angular position of the arm 44 5 029 Y *to obtain the reading shown in the figure.*

d) Always in the same conditions we should have the clearance of 0.2 *mm. shown in the figure* 267. *Act if necessary on the extension* **A** *of the plate* 44 5 032 K.

44 5 029 Y	Entry control plate control upper arm
44 5 030 V	Entry control plate control lower arm
44 5 032 K	Entry control plate
44 5 140 G	Small slide restoring first transmission lever


267
44 5 032 K
mm.0,2
A
266
M
44 5 032 K
mm.1÷1,4
44 5 029 Y
44 5 140 G
44 5 030 V

207 - FIGURE 268

Preparing the slide-plates connection support plate.

a) In the appropriate guide hole of the plate 44 5 164 U insert the column 43 7 032 B with the washer 940 3 03 L.

b) Assemble the slide hooking dog 44 5 021 Q by means of the pivot 44 5 022 R which should be screwed but not right home on the column 43 7 032 B. The extension **A** of the dog 44 5 021 Q must be placed in the slot **K** of the plate 44 5 164 U.

c) On the column 43 7 032 B place the bridge 44 6 040 G which must be secured by a spring-clip 945 2 51 G.

d) Between the plate 44 5 164 U and the hole **F** of the dog 44 5 021 Q, hook the spring 40 2 145 X.

e) Hook the spring 40 8 152 C to the bridge 44 6 040 G.

208 - FIGURE 269

Assembling the slide-plates connection supporting plate.

a) Between the left external slide-plate and the right internal slide-plate of the machine place the plate 44 5 164 U prepared in the precedent paragraph. Secure it by means of four screws 920 3 02 F which should not be tightened right home.

In the fork of the bridge 44 6 040 G we must place the rear extension of the hook 44 6 037 R; the same bridge 44 6 040 G must take, with respect to the small slide 44 6 022 J, the position illustrated in the figure.

b) Hook the spring 40 8 152 C to the plate 44 5 164 U.

209 - FIGURE 269

Assembling the slide movement second transmission lower arm and its upper arm.

a) In the appropriate guide hole of the base insert the shaft of the arm 44 5 142 W which should be afterward placed in the corresponding hole of the plate 44 5 164 U.

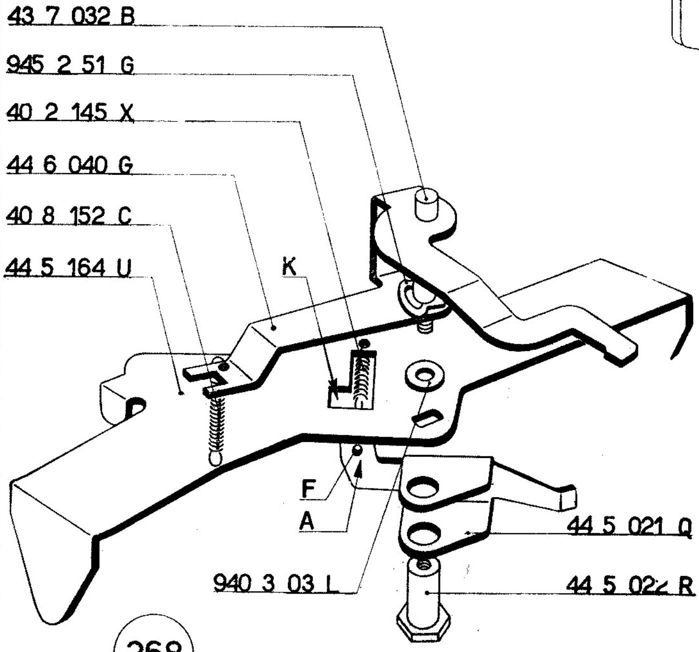
b) On the same shaft place the upper arm 44 5 143 X with the two screws 922 3 51 V.

In the fork of the arm place the comb 44 5 418 T.

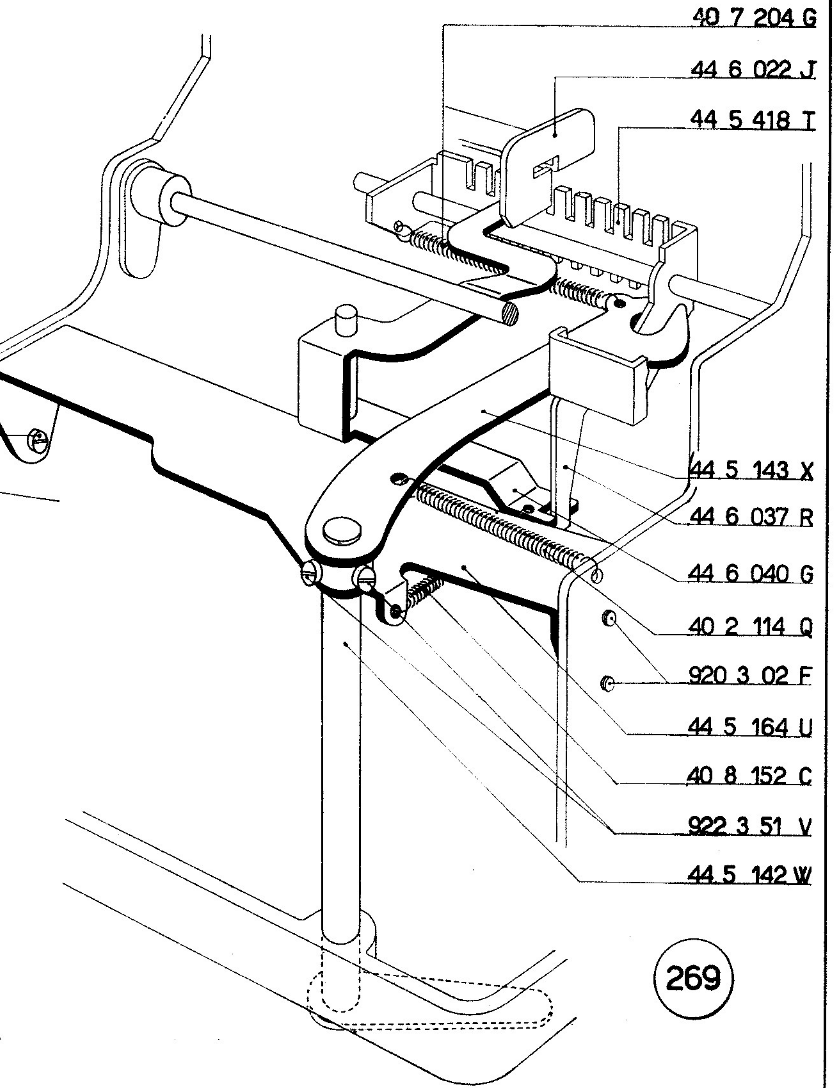
c) Between the arm 44 5 143 X and the comb 44 5 418 T, hook the spring 40 7 204 G.

d) Between the arm 44 5 143 X and the slide-plate of the machine, hook the spring 40 2 114 Q.

e) *Check that the shaft of the arm* 44 5 142 W *rotates freely;* then tighten the four screws 920 3 20 F which secure the plate 44 5 164 U.

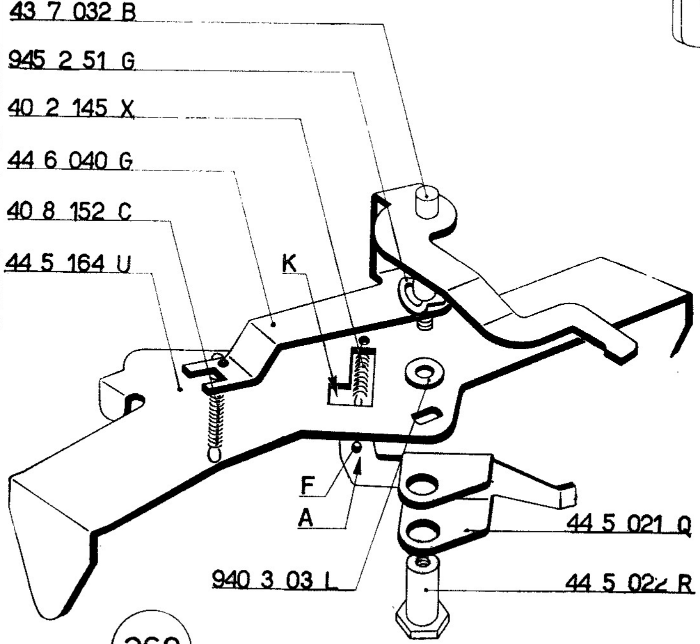

43 7 032 B
945 2 51 G
40 2 145 X
44 6 040 G
40 8 152 C
44 5 164 U
K
F
A
940 3 03 L
44 5 021 Q
44 5 022 R

268

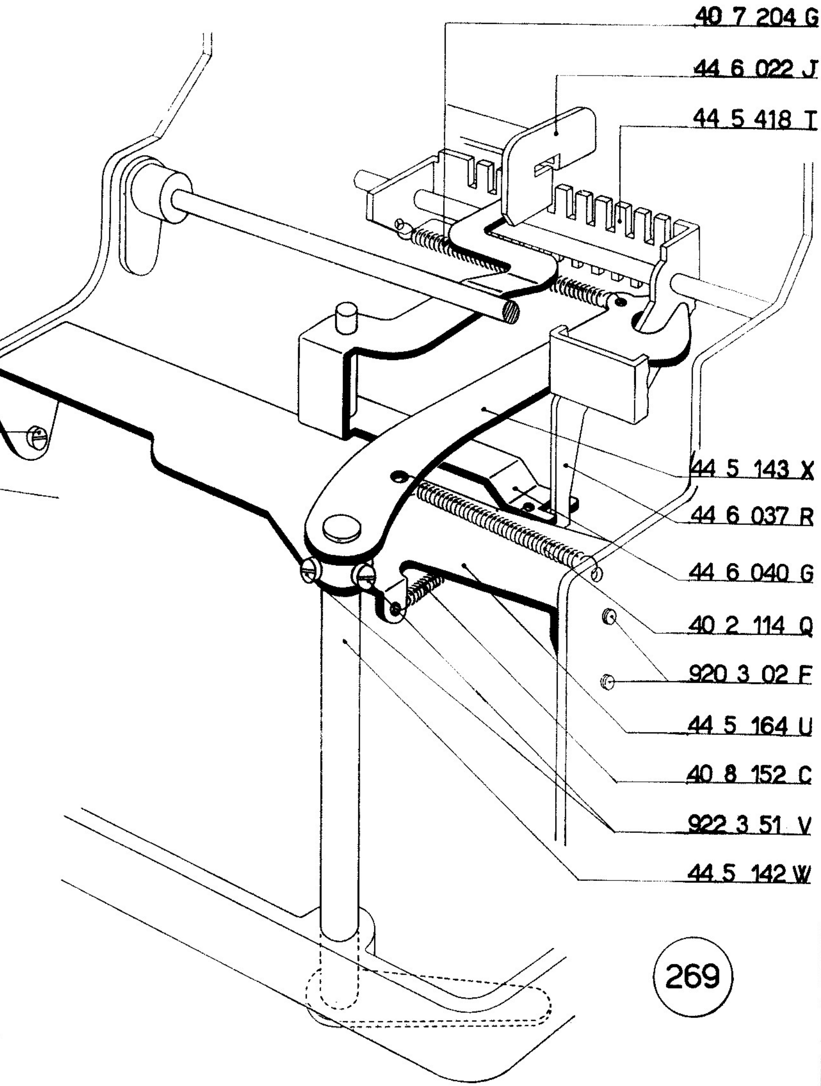

40 7 204 G
44 6 022 J
44 5 418 T
920 3 02 F
44 5 143 X
44 6 037 R
44 6 040 G
40 2 114 Q
920 3 02 F
44 5 164 U
40 8 152 C
922 3 51 V
44 5 142 W

269

44 5 021 Q	Small slide hooking dog
44 5 022 R	Small slide hooking dog pivot
44 5 142 W	Shaft of the slide movement second transmission lower arm
44 5 143 X	Slide movement second transmission upper arm
44 5 164 U	Slide-plates connection supporting plate
44 5 418 T	Small slide dragging comb
44 6 022 J	Quotient slide
44 6 037 R	Partial restoring and printing control hook
44 6 040 G	Transmission bridge of the partial restoring and printing control hook
40 2 114 Q	Spring for 44 5 143 X
40 2 145 X	Spring for 44 5 021 Q
40 7 204 G	Spring for 44 5 418 T and 44 5 153 X
40 8 152 C	Spring for 44 6 040 G
43 7 032 B	Column for 44 6 040 G
920 3 02 F	Securing screw for 44 5 164 U
922 3 51 V	Scrrew for 44 5 142 W
940 3 03 L	Washer for 43 7 032 B
945 2 51 G	Spring-clip


43 7 032 B
945 2 51 G
40 2 145 X
44 6 040 G
40 8 152 C
44 5 164 U
K
F
A
940 3 03 L
44 5 021 Q
44 5 022 R

268


40 7 204 G
44 6 022 J
44 5 418 T
920 3 02 F
44 5 143 X
44 6 037 R
44 6 040 G
40 2 114 Q
920 3 02 F
44 5 164 U
40 8 152 C
922 3 51 V
44 5 142 W

269

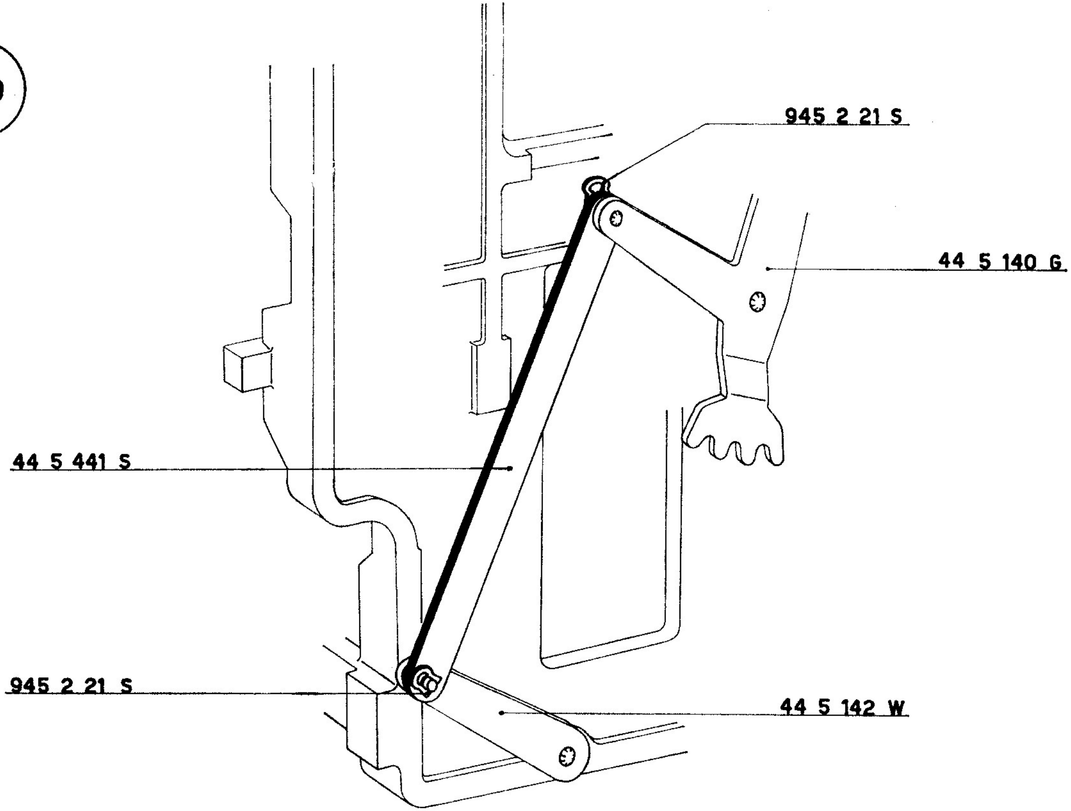
210 - FIGURE 270

Assembling the slide movement transmission connecting-rod.

Connect the arm 44 5 152 W to the lever 44 5 140 G by means of the connecting-rod 44 5 441 S. Secure it with two spring-clips 945 2 21 S.

44 5 140 G	Small slide restoring transmission lever
44 5 142 W	Small slide movement second transmission lower arm
44 5 441 S	Slide movement transmission connecting-rod
945 2 21 S	Spring-clip

270


945 2 21 S
44 5 140 G
44 5 441 S
945 2 21 S
44 5 142 W

211 - FIGURES 271 - 272 - 273

Adjusting the position of the small slide dragging comb.

a) Move the main shaft to rest.

b) See that the small multiplier slide is hooked to the dog 44 5 021 Q.

c) Move the first rack **M** *of the memory unit to position « five ».*

d) Enter a figure; adjust the position of the arm 44 5 143 X *so that the wing* **A** *of the plate* **P** *is quite centered with respect to the second left slot* **I** *of the comb* 44 5 418 T *(figure* 271*). Tighten but not right home one of the screws of the arm* 44 5 143 X.

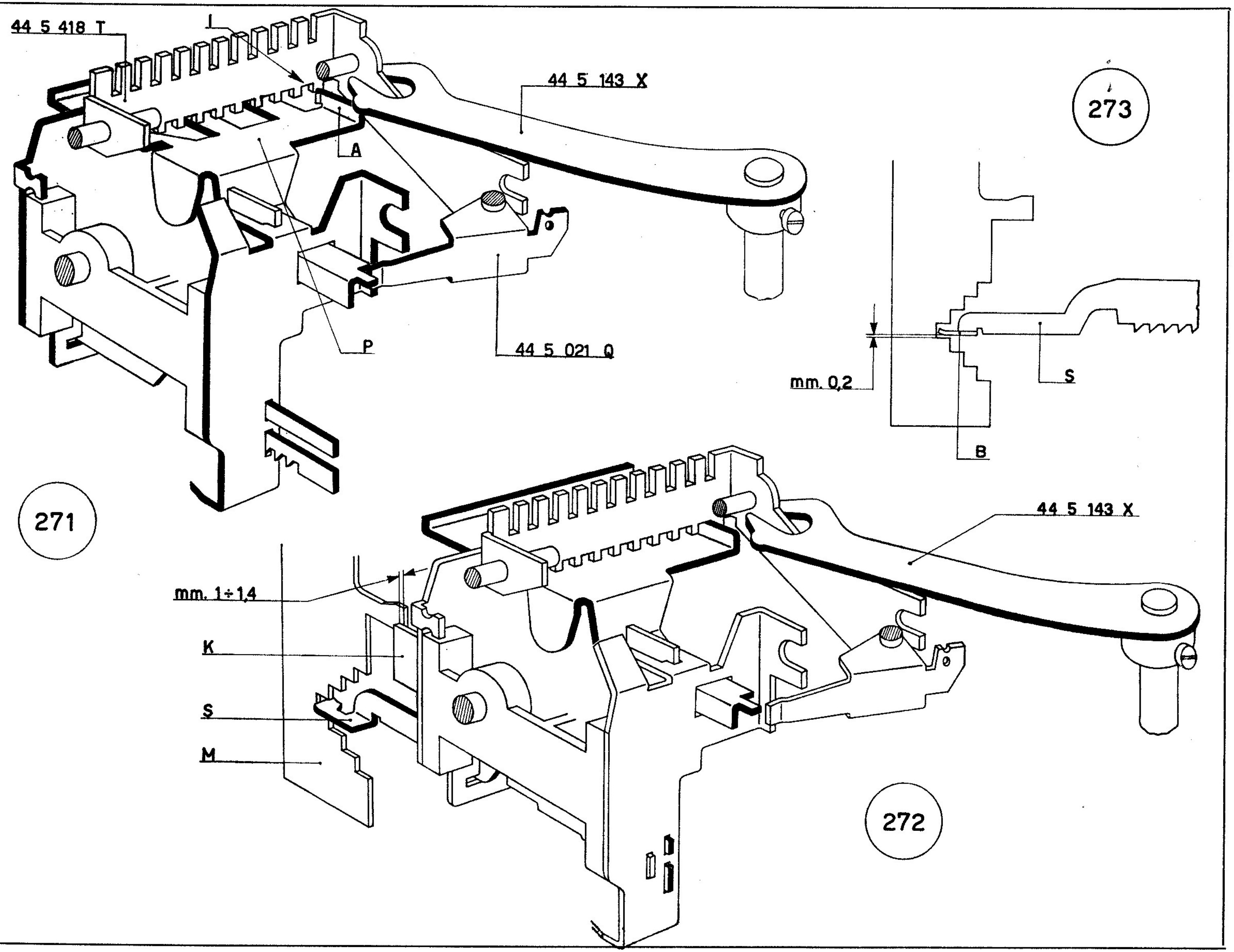
e) Depress the « multiplication control » key; rotate the main shaft by about 90° *and check that the testing rod* **K** *is at* 1÷1.4 *mm. from the small rack* **M** *(figure* 272*).*

This condition is obtained by adjusting once for all the angular position of the arm 44 5 143 X.

Check also that the gauge **S** *has the minimum clearance of* 0.2 *mm. shown in the figure* 273*. This clearance should be checked by reducing downward the play of the gauge. Act if necessary on the wing* **B** *of the gauge.*

f) Complete the cycle of the main shaft moving it back to rest.

44 5 021 Q	Small slide hooking dog
44 5 143 X	Slide movement second transmission upper arm
44 5 418 T	Small slide dragging comb


44 5 418 T
I
A
44 5 143 X
P
44 5 021 Q
mm. 0,2
S
B
mm. 1÷1,4
K
S
M
44 5 143 X

271

272

273

212 - FIGURE 274

Adjusting the rest position of the multiplication slide.

a) Move the machine to rest.

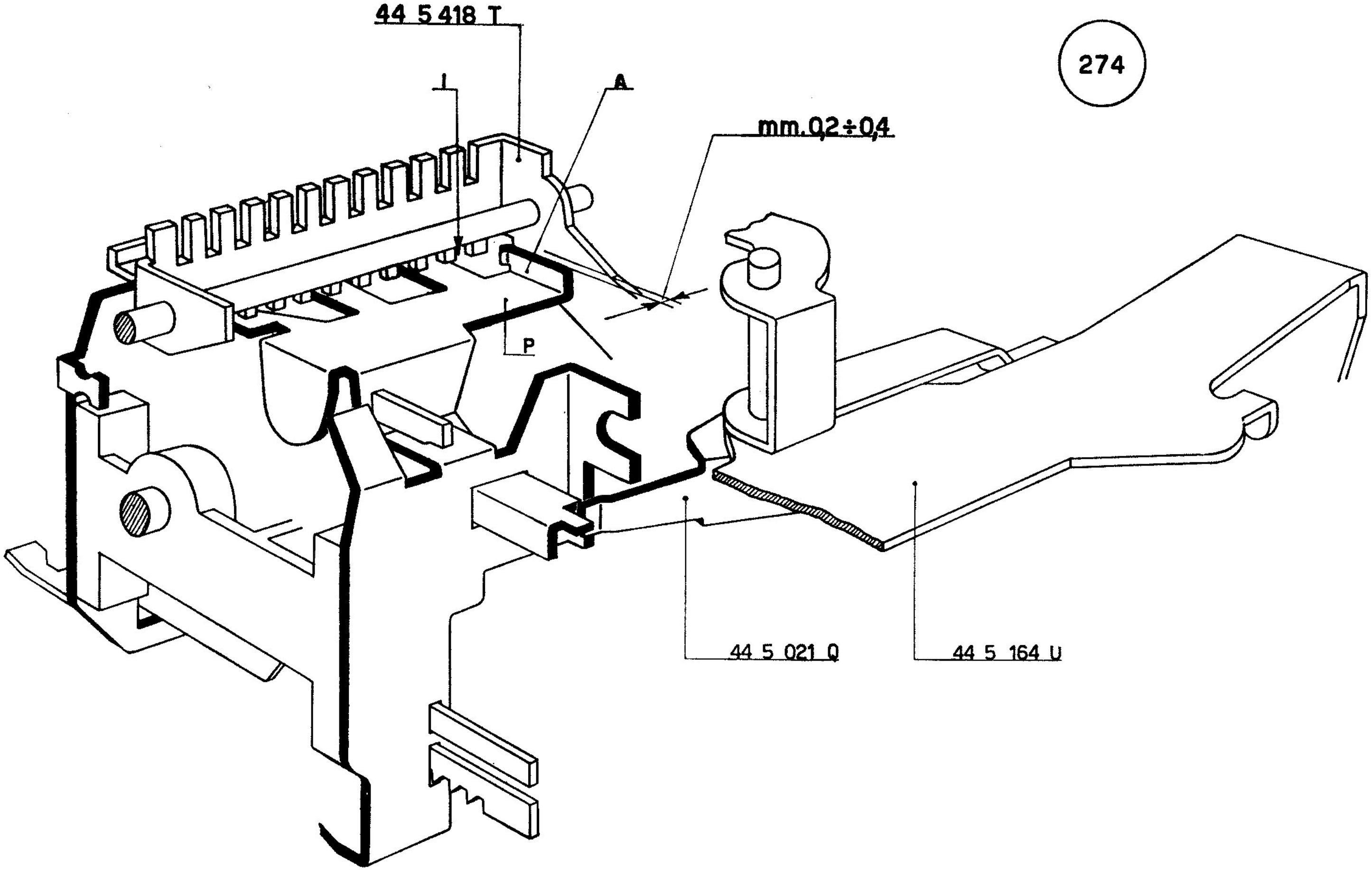
b) Move suitably the small slide hooking dog along the slot of the plate 44 5 164 U *to obtain the reading shown in the figure.*

c) Enter a figure on the keyboard; depress the « multiplication control » key. Check that the wing **A** *of the plate* **P** *enters in the second slot* **I** *of the comb* 44 5 418 T. *Rotate the main shaft to rest position.*

d) Enter all the slide; depress the « multiplication control » key. Check that the wing **A** *of the plate* **P** *enters in the last slot of the comb* 44 5 418 T. *Move the main shaft back to rest.*

e) If the wing **A** *doesn't enter in the required slots it will be necessary checking again the adjustment described at point* b).

44 5 021 Q	Small slide hooking dog
44 5 164 U	Slide-plates connection supporting plate
44 5 418 T	Small slide dragging comb


44 5 418 T
I
A
mm.0,2÷0,4
274
P
44 5 021 Q
44 5 164 U

213 - FIGURE 275

Checking the small slide restoring.

a) Move the main shaft to rest.

b) Depress an add key and rotate the main shaft to full slide restoring.

c) In these conditions we should obtain the clearance of 0.3 *mm. shown in the figure. Check again if necessary the adjustment of the slide restoring described at paragraph* 147.

44 5 021 Q Small slide hooking dog

214 - FIGURE 276

Adjusting the small slide hooking dog.

a) Move the main shaft to rest.

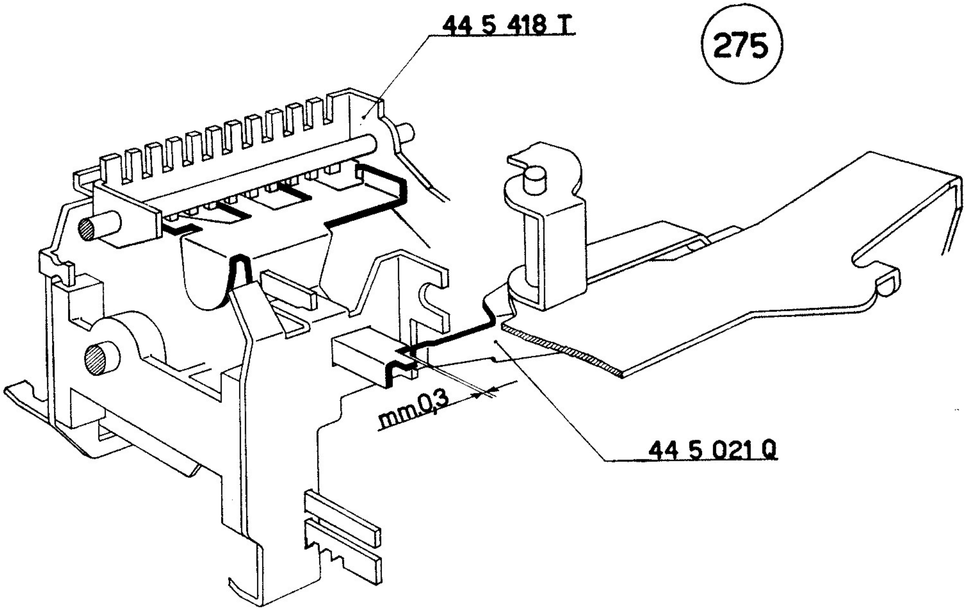
b) Check that the extension of the small slide hooking dog 44 5 021 Q *is in the position illustrated in the figure (line* **a-a**). *Act if necessary on the wing* **A** *of the dog.*

c) Depress the « multiplication control » key; the plate **P** *must not leave the dog* 44 5 021 Q. *Check again if necessary the adjustment described at point* b).

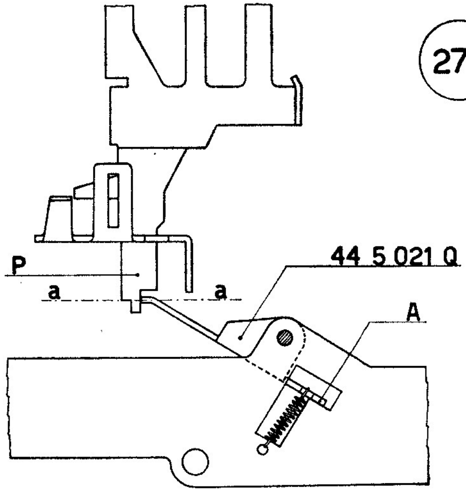
d) Move the main shaft back to rest.

44 5 418 T Small slide dragging comb

275


44 5 418 T
mm0,3
44 5 021 Q

276


44 5 021 Q
A
P
a
a

215 - FIGURE 277

Assembling the calculation connecting-rod and its arm.

a) On the shaft 44 5 049 C place the arm 44 5 048 B with the two screws 920 3 02 F.

b) Between the arm 44 5 048 B and the bridge 44 5 370 N place the calculation connecting-rod 44 5 051 W. Secure it by means of two spring-clips 945 2 21 S.

216 - FIGURE 277

Assembling the automatic tabulation control anchor and its small connecting-rod.

a) On the pivot of the lever 44 6 014 J place the anchor 44 6 015 K; secure it by means of a spring-clip 945 2 21 S.

b) Between the pivot of the arm 44 6 017 M and the pivot of the anchor 44 6 015 K place the small connecting-rod 44 6 016 L. Between the two pivots, hook the spring 40 7 204 G.

217 - FIGURES 277 and 278

Assemblind the engagement anchor and bridge.

a) On the shaft 44 5 020 T place the engagement anchor-bridge 44 5 151 X; secure it with a spring-clip 945 3 41 A.

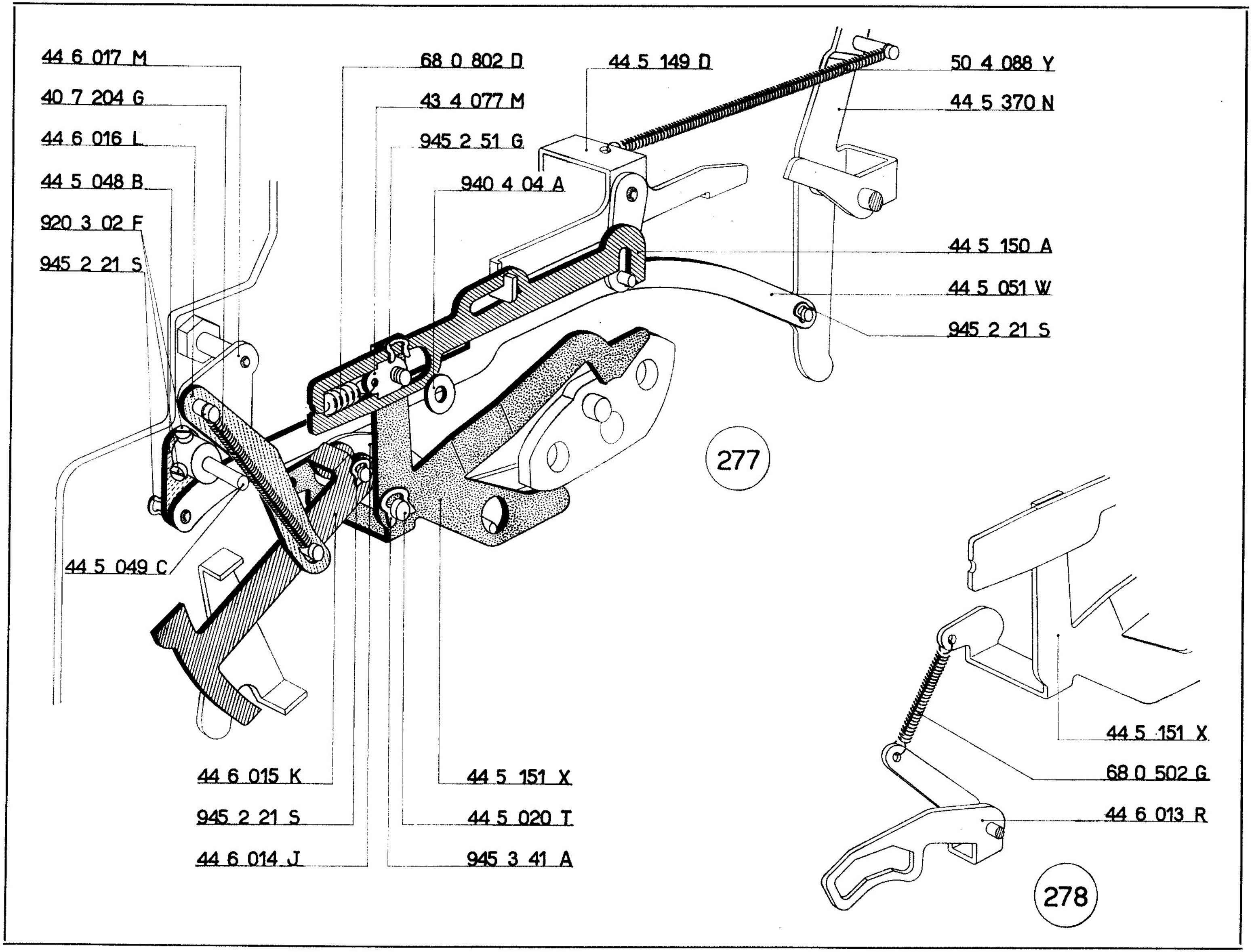
b) In the appropriate seat of the engagement anchor 44 5 150 A place the special spring-holder 43 4 077 M. Between this latter and the anchor, hook the spring 68 0 802 D.

c) Assemble this anchor as illustrated in the figure. Secure it with a spring-clip 945 2 51 G and by interposing the washer 940 0 04 A.

d) Between the bridge 44 5 149 D and the bridge 44 5 310 N, hook the spring 50 4 088 Y.

e) Between the bridge 44 5 151 X and the stabilizer 44 6 013 R, hook the spring 68 0 502 G (figure 278).

44 5 020 T	Small slide shaft
44 5 048 B	Calculation bar right arm
44 5 049 C	Calculation bar shaft
44 5 051 W	Calculation connecting-rod
44 5 149 D	Engagement anchor control bridge
44 5 150 A	Engagement anchor
44 5 151 X	Engagement anchor-bridge
44 5 370 N	Non-add subtraction control bridge
44 6 013 R	Arm holding plate control stabilizer
44 6 014 J	Automatic tabulation control lever
44 6 015 K	Automatic tabulation control anchor
44 6 016 L	Connecting-rod for anchor
44 6 017 M	Arm with stroke-counter control shaft
40 7 204 G	Spring for 44 6 015 K
43 4 077 M	Special spring-holder
50 4 088 Y	Spring for 44 5 149 D - 44 5 370 N
68 0 502 G	Spring for 44 5 151 X - 44 6 013 R
68 0 802 D	Spring for 44 5 150 A - 43 4 077 M
920 3 02 F	Screw for 44 5 048 B
940 4 04 A	Washer
945 2 21 S	Spring-clip
945 2 51 G	Spring-clip
945 3 41 A	Spring-clip


44 6 017 M
40 7 204 G
44 6 016 L
44 5 048 B
920 3 02 F
945 2 21 S
68 0 802 D
43 4 077 M
945 2 51 G
940 4 04 A
44 5 149 D
50 4 088 Y
44 5 370 N
44 5 150 A
44 5 051 W
945 2 21 S
44 5 049 C
277
44 6 015 K
945 2 21 S
44 6 014 J
44 5 151 X
44 5 020 T
945 3 41 A
44 5 151 X
68 0 502 G
44 6 013 R
278

218 - FIGURE 279

Adjusting the angular position of the division and multiplication cams unit.

a) Move the main shaft to rest.

b) Be sure that the engagement anchor-bridge rests on the shaft 44 5 058 D. *Adjust the angular position of the cams unit* 44 5 311 X *to obtain the reading shown in the figure.*

44 5 058 D	Shaft of the stroke-counter testing hook-lever
44 5 150 A	Engagement anchor
44 5 151 X	Engagement anchor-bridge

219 - FIGURES 280 and 281

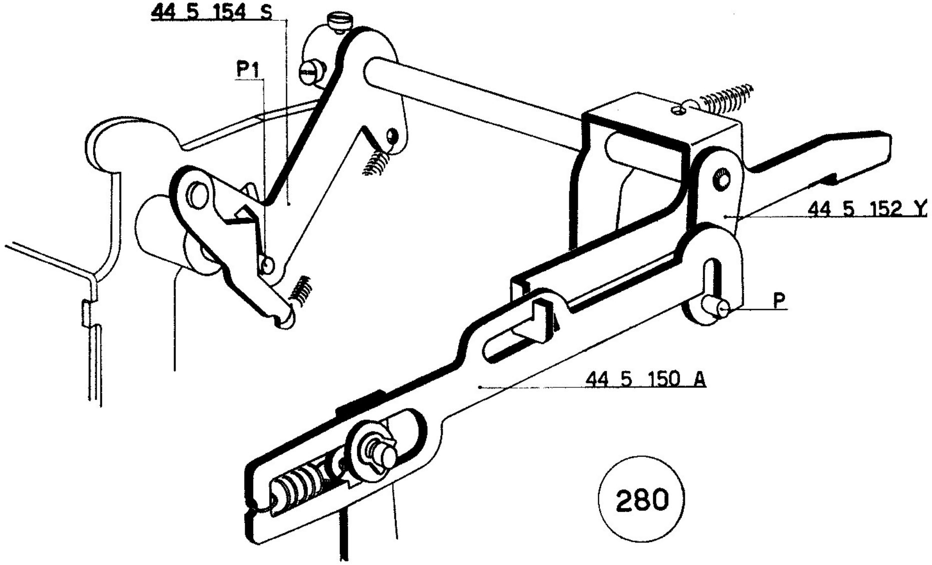
Adjusting the engagement control arm.

a) Rotate the cam-lever 44 5 154 S *to disengage the memory unit.*

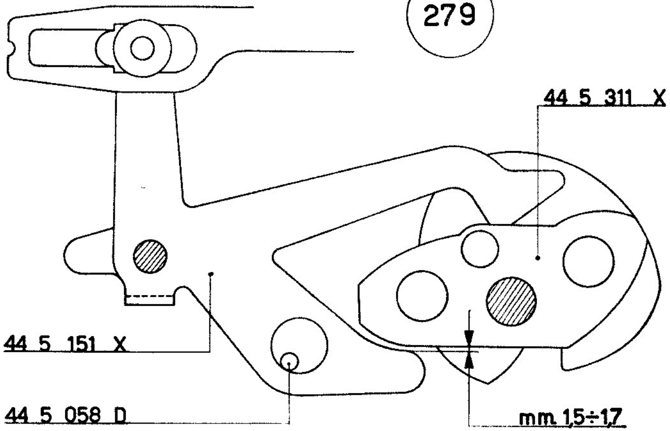
b) Adjust the axial position of the cam-lever by centering it with respect to the pivot **P1**.

b) Adjust the angular position of the arm 44 5 152 Y *which should be centered with respect to the slot of the anchor* 44 5 150 A *(see the figure* 281).

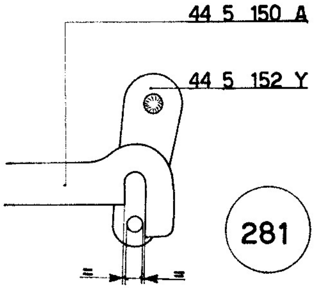
44 5 152 Y	Engagement control arm
44 5 154 S	Small racks engagement control cam-lever
44 5 311 X	Division and multiplication cams unit


44 5 154 S
P1
44 5 152 Y
P
44 5 150 A

280


44 5 311 X
44 5 151 X
44 5 058 D
mm 1,5÷1,7

279


44 5 150 A
44 5 152 Y
=
=

281

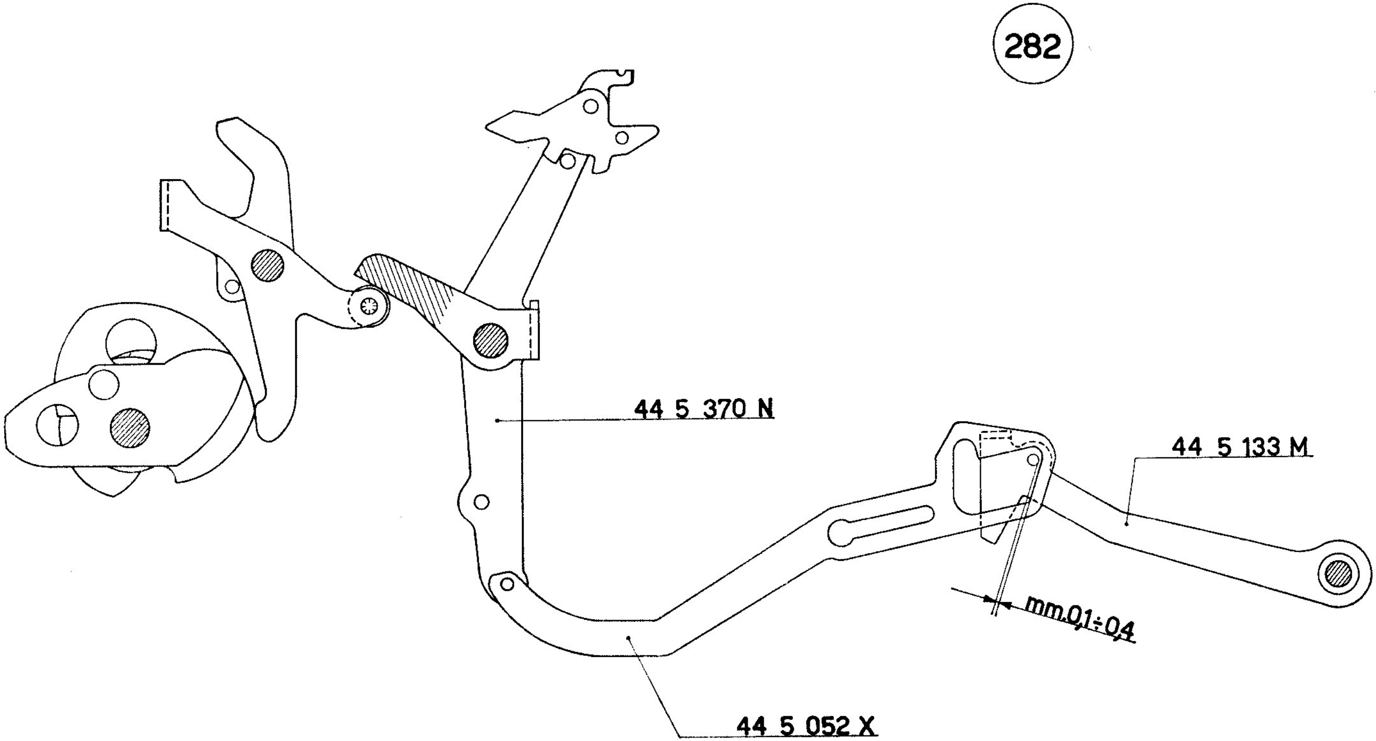
220 - FIGURE 282

Adjusting the non-add and subtraction control bridge.

a) Move the main shaft to rest.

b) In these conditions we should have the clearance of 0.1÷0.4 *mm. shown in the figure. Act if necessary on the hachured spot of the bridge* 44 5 370 N.

44 5 052 X	Non-add connecting-rod
44 5 133 M	Servomechanism selecting stay control left arm
44 5 370 N	Non-add and subtraction control bridge


282
44 5 370 N
44 5 133 M
mm.0,1÷0,4
44 5 052 X

221 - FIGURES 283 - 284 - 285

Adjusting the multiplication calculation control.

a) Enter 90*; depress the « memory input » motor key* « X » *and rotate the main shaft by* 360° *(one cycle).*

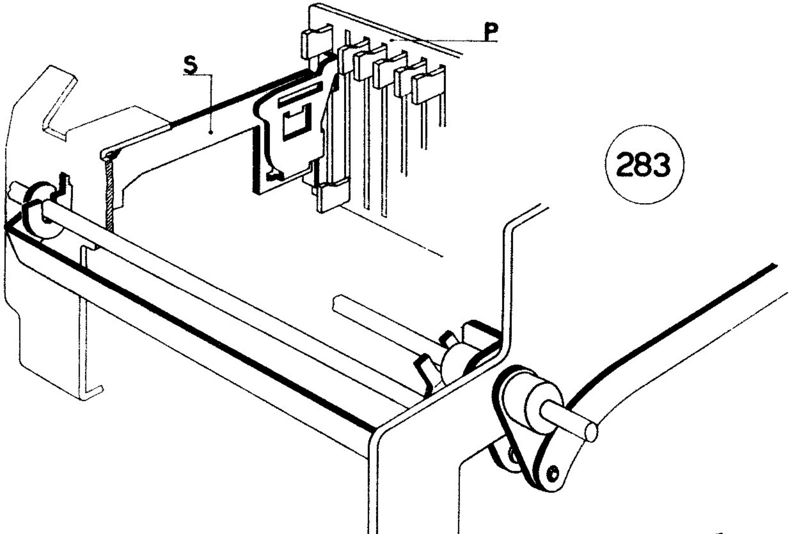
b) Enter a figure and depress the « multiplication control » key. Rotate the main shaft by about 90°. *Check that the gauge* **S** *of the small multiplication slide is in contact with the comb* **P** *of the memory unit (figure* 283*).*

c) Check that the arm 44 5 133 M *is in contact with the pivot of the « division control » key* 44 4 002 V *(figure* 284*).*

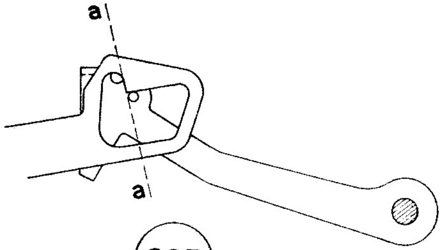
In these conditions adjust the axial position of the arm 44 5 048 B *to obtain the clearance of* 0.1 *mm. shown in the figure* 284. *The axial position of the arm is exact when the connecting-rod* 44 5 051 W *is parallel to the side-plate of the machine.*

d) Rotate the main shaft a full cycle plus another rotation of 90°. *The pivot of the arm* 44 5 133 M *should be straight-lined with the line* **a-a** *shown in the figure* 285.

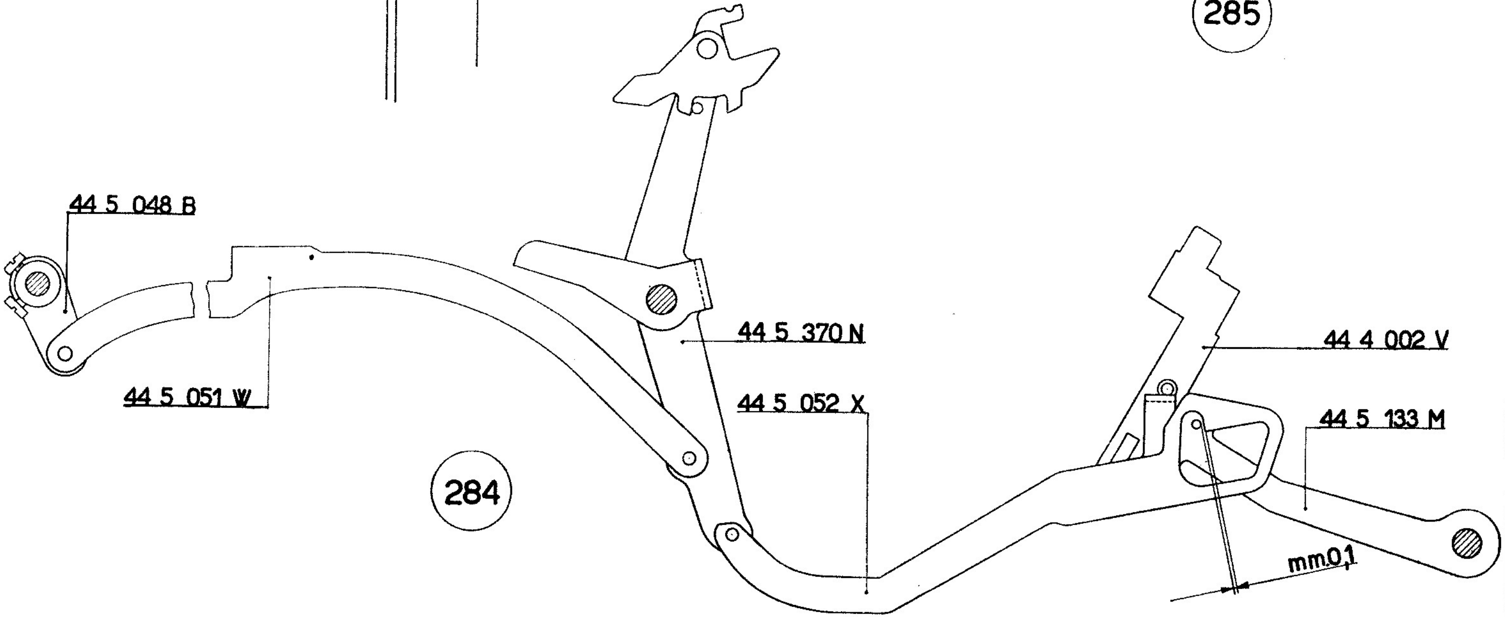
44 4 002 V	« Division control » key-stem
44 5 048 B	Calculation bar right arms
44 5 051 W	Calculation connecting-rod
44 5 052 X	Non-add connecting-rod
44 5 370 N	Non-add and subtraction control bridge
44 5 133 M	Servomechanism selecting stay control left arm


P
S

283


a
a

285


44 5 048 B
44 5 370 N
44 4 002 V
44 5 051 W
44 5 052 X
44 5 133 M
mm0,1

284

222 - FIGURES 286 and 287

Adjusting the passage of the tooth assembled on the subtraction control bridge with respect to the subtraction arm.

a) Move the memory to zero and the main shaft to rest.

b) Enter a figure and depress the « multiplication control » key.

c) Rotate the main shaft by about 90° to reach the position illustrated in the figure 286. Check that between the tooth **D** *and the wing* **A** *of the bridge* 44 5 181 N *there is a little clearance* **L.**

44 5 181 N Subtraction arm

a) Move the main shaft to rest.

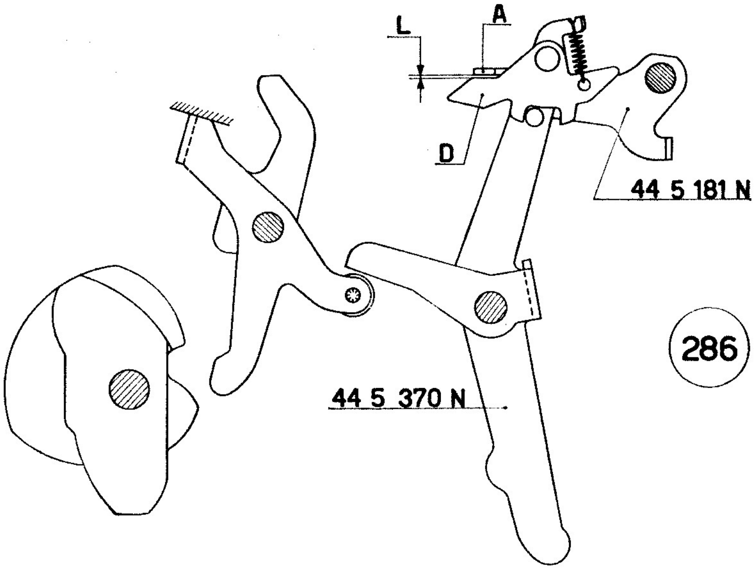
e) Enter a figure and depress the negative multiplication key.

f) Rotate the main shaft by about 90° to reach the position illustrated in the figure 287. Check that between the tooth **D** *and the wing* **A** *of the bridge* 44 5 181 N *there is a little clearance* **L.**

g) Move the main shaft to rest.

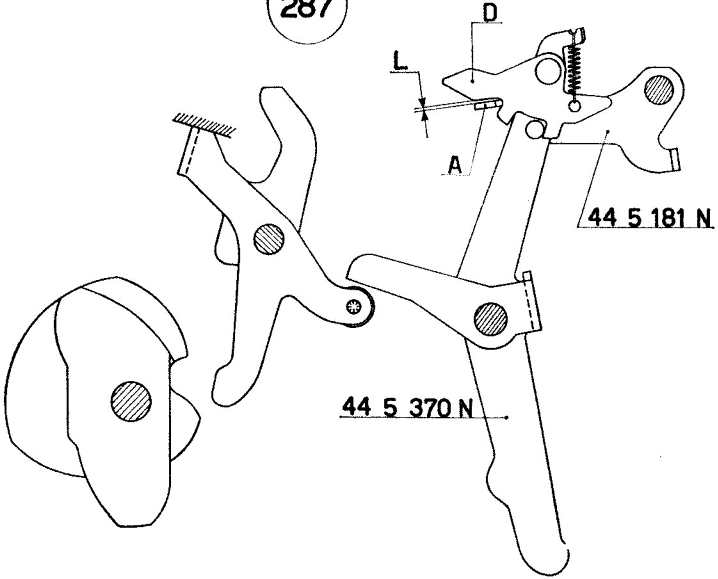
h) The above conditions are obtained by acting suitably on the wing **A** *of the bridge* 44 5 181 N.

44 5 370 N Non-add and subtraction control bridge


L
A
D
44 5 181 N
44 5 370 N

286

287


D
L
A
44 5 181 N
44 5 370 N

223 - FIGURES 288 and 289

Adjusting the arm of the multiplication stop control frame.

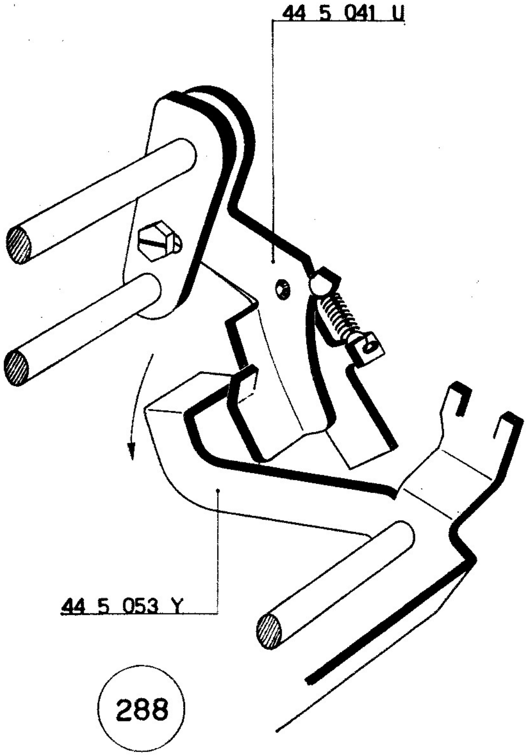
a) Enter the number 90 *and depress the « memory input » motor key. Make the main shaft performing one cycle.*

b) Enter a figure and depress the « multiplication control » key. Rotate slowly the main shaft. After a rotation of about 200° *the arm of the bridge* 44 5 053 Y *(which rotates in the direction shown by the arrow - figure* 288) *should contact without forcing the bent wing of the arm* 44 5 041 U.

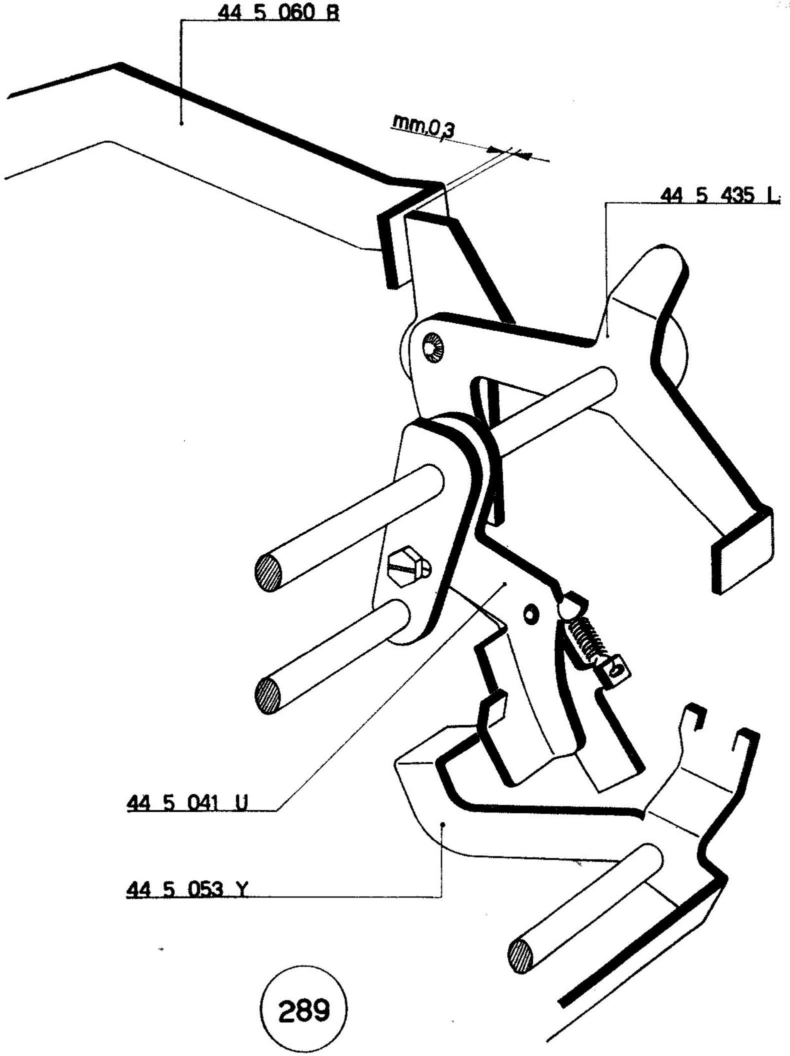
c) Carry on rotating the main shaft to complete the cycle and return to the precedent position. The arm 44 5 041 U *rests on the bridge* 44 5 053 Y*; check the clearance of* 0.3 *mm. (minimum value) shown in the figure* 289.

d) The two conditions are obtained by adjusting the angular position of the arm 44 5 041 U.

44 5 041 U	Adjustable arm of the multiplication stop control frame
44 5 053 Y	Subtraction stop exclusion bridge
44 5 060 B	Multiplication stop control lever
44 5 435 L	Stop control arm


44 5 041 U
44 5 053 Y

288


44 5 060 B
mm.0,3
44 5 435 L
44 5 041 U
44 5 053 Y

289

224 - FIGURES 290 and 291

Adjusting the multiplication stop.

a) Enter a series of 1 *and depress the « memory input » motor key. Make the main shaft rotating one cycle.*

b) With the main shaft at rest, the bridge 44 5 370 N *is stabilized by the bridge* 44 5 417 J *(figure* 290*). Consequently the calculation connecting-rod* 44 5 051 W *connected to the bridge* 44 5 370 N *determines the rest position of the arm* 44 5 047 S *and therefore that of the gauge* **S**. *Between the wing* **A** *of the arm* 44 5 047 S *and the crank* **M** *of the arm* 44 5 041 U *thre should be, at rest, a clearance of* 0.2 *mm. (figure* 290*). The gauge* **S** *should be at* 0.5 *mm. (minimum value) from the extensions of the racks of the memory unit.*

c) Depress an add key and rotate the main shaft by about 90°.

The bridge 44 5 417 J *releases by rotating the bridge* 44 5 370 N. *The complete cinematic moves forward and the arm* 44 5 047 S *goes resting on the crank* **M** *of the arm* 44 5 041 U *(figure* 291*).*

In these conditions the gauge **S** *should be at* 0.3 *mm. (minimum value) from the extension of the racks of the memory unit.*

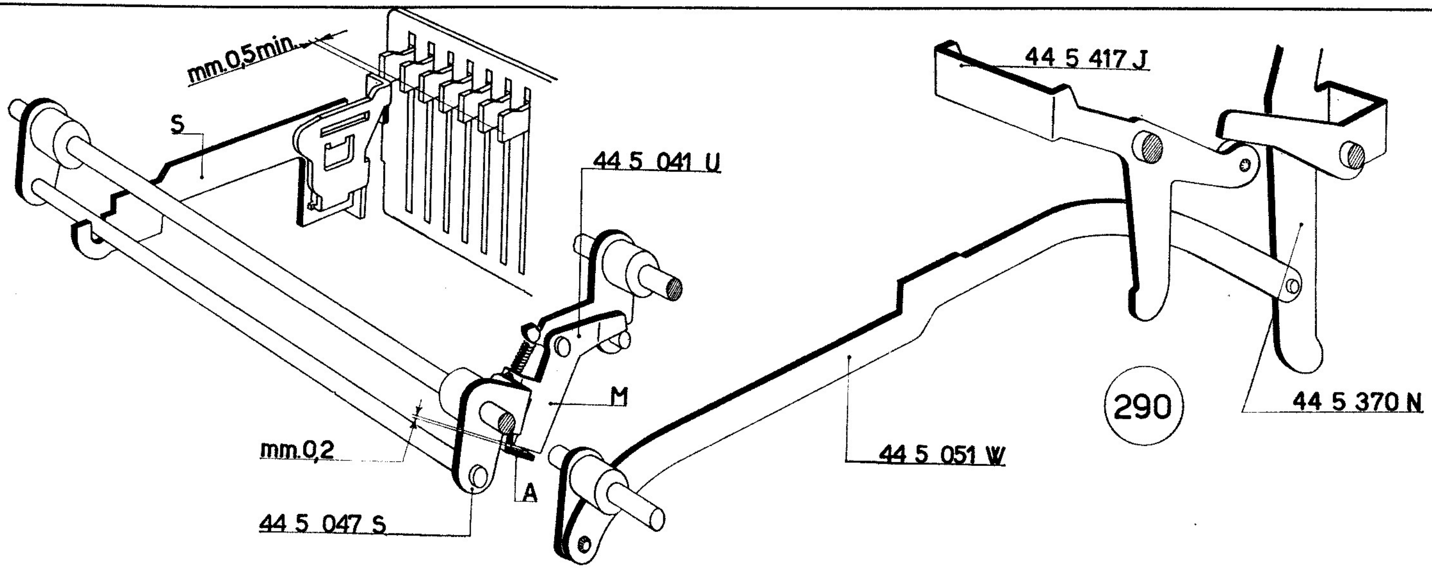
d) We may have three cases:

— there is not the clearance of 0.2 *mm. shown in the figure* 290 *while there is that of* 0.5 *mm. In this case bent the wing* **A** *of the arm* 44 5 047 S;

— there is not the clearance of 0.2 *mm. shown in the figure* 290 *while that of* 0.5 *mm. has smaller value. In this case check again the adjustment done at paragraph* 220;

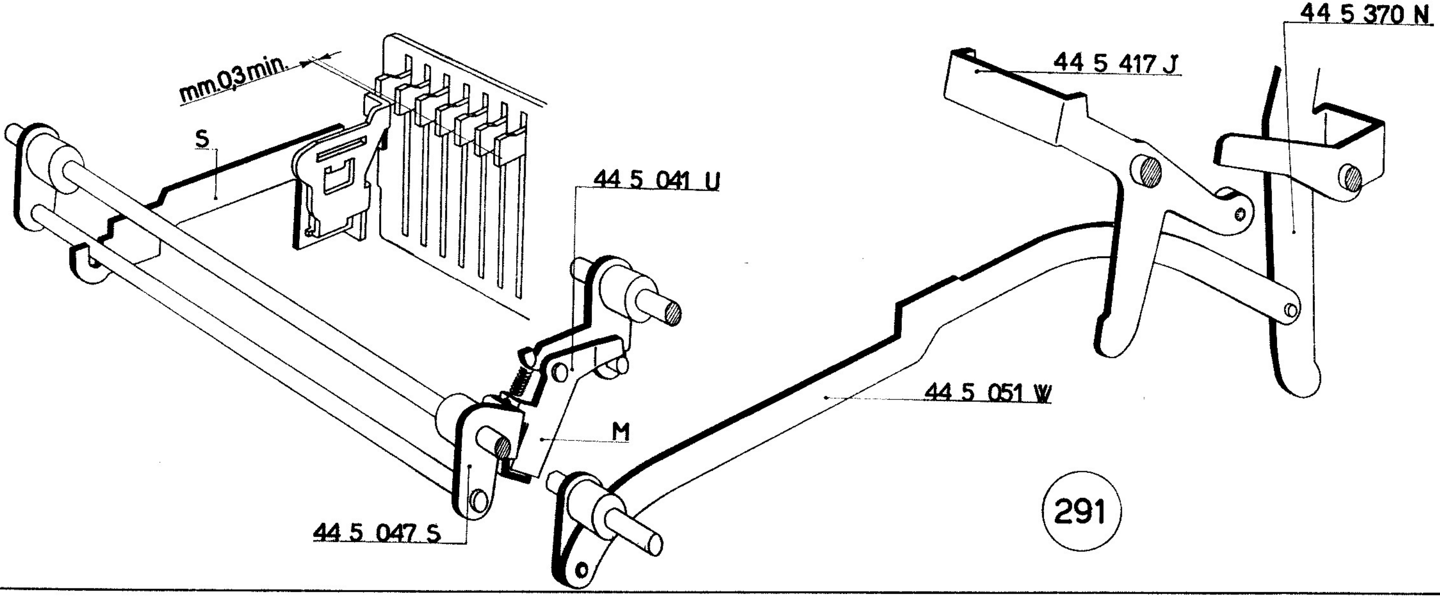
— the clearance of 0.2 *mm. shown in the figure* 290 *is exact but that of* 0.5 *mm. is scarce. In this case check again the adjustment done at paragraph* 220 *and act consequently on the wing* **A** *of the arm* 44 5 047 S.

44 5 041 U	Adjustable arm of the multiplication stop control frame
44 5 047 S	Calculation bar left arm
44 5 051 W	Calculation connecting-rod
44 5 370 N	Non-add and subtraction control bridge
44 5 417 J	Multiplication tester and division connecting-rod control bridge



290

mm.0,5min.
S
44 5 417 J
44 5 041 U
M
mm.0,2
A
44 5 047 S
44 5 051 W
44 5 370 N



291

44 5 370 N
44 5 417 J
mm.0,3min.
S
44 5 041 U
M
44 5 051 W
44 5 047 S

225 - FIGURE 292

Adjusting the entrace clearance of the comb 44 5 118 W on the arm 44 5 047 S.

a) Entre completely the slide.

b) Check the clearance of 0.2 *mm. shown in the figure. Act if necessary on the hachured spot of the wing of the arm* 44 5 047 S.

226 - FIGURES 293 and 294

Adjusting the release and restoring of the stroke-counter gauge.

a) Check that the number 90 *is entered in the memory.*

b) Enter a figure and depress the « multiplication control » key.

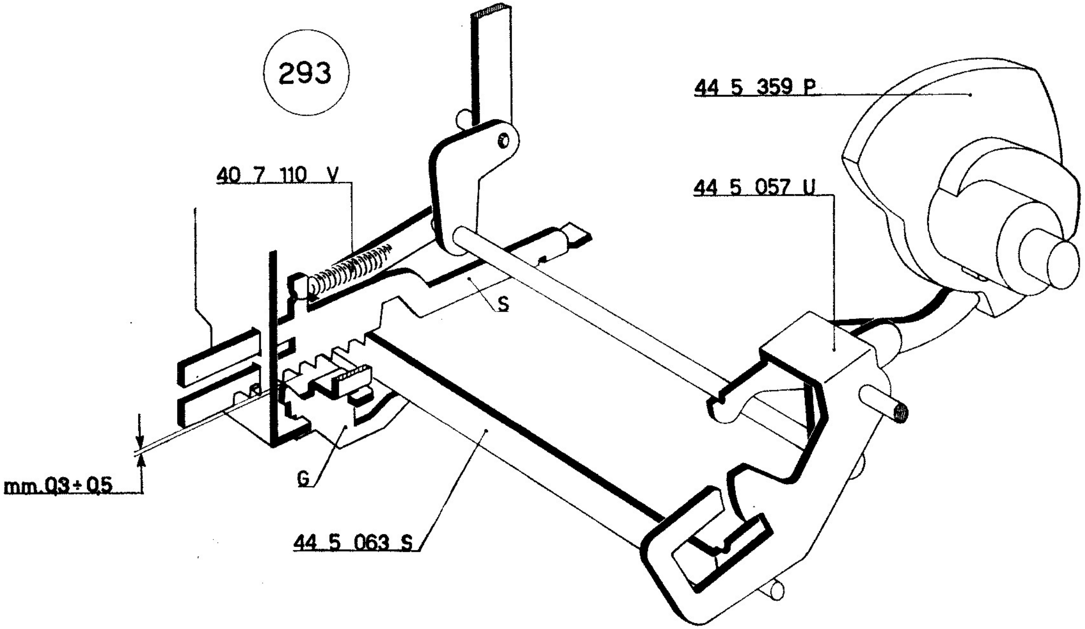
c) Rotate the main shaft by about TD° *to obtain the maximum travel downward of the stroke-counter bridge* 44 5 063 S. *This latter has dragged the hook* **G** *downward; between this latter and the gauge* **S**, *there must be the clearance of* 0.3÷0.5 *mm. shown in the figure. Act if necessary on the lever* 44 5 057 U.

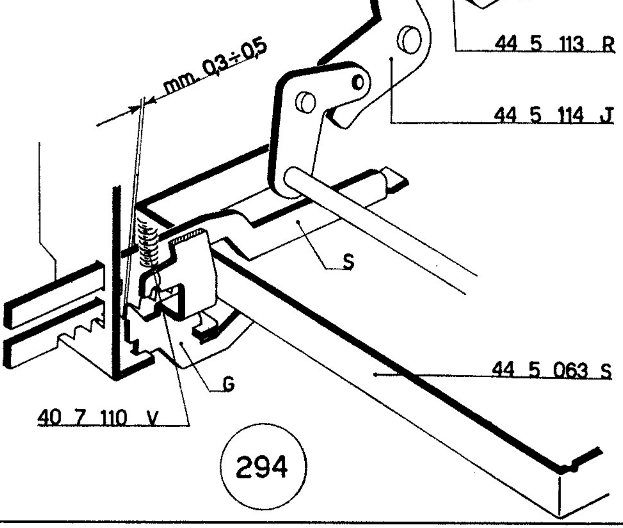
d) Still rotate the main shaft to perform a rotation of about 90°. *The stroke-counter-bridge* 44 5 063 S *should have restored completely the gauge* **S**, *after having moved up. Between the gauge and the hook* **G** *there must be the clearance of* 0.3÷0.5 *mm. shown in the figure* 294. *Act if necessary on the lower support which guides and establishes the position of the hook* **G**.

e) Move the main shaft back to rest.

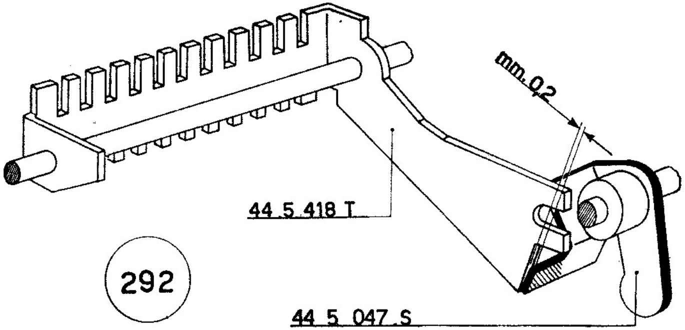
44 5 047 S	Calculation bar left arm
44 5 057 U	Stroke-counter testing hook-lever
44 5 063 S	Stroke-counter bridge
44 5 113 R	Stroke-counter frames control cam
44 5 114 J	Stroke-counter frames control arm
44 5 359 P	Small racks clearing control cam
44 5 418 T	Small slide dragging comb
40 7 110 V	Spring for the stroke-counter testing rod and the proper hook.

293


44 5 359 P
40 7 110 V
44 5 057 U
S
mm.0,3÷0,5
G
44 5 063 S


44 5 113 R
mm.0,3÷0,5
44 5 114 J
S
44 5 063 S
G
40 7 110 V

294


mm.0,2
44 5 418 T
44 5 047 S

292

227 - FIGURES 295 - 296 - 297

Adjusting the escapement control during the multiplication.

a) Check to have the number 90 in the memory.

b) Enter a figure and depress the « multiplication control » key.

c) Rotate the main shaft until obtaining the maximum rearward travel of the bridge 44 5 063 S *(about* 190°*).*

The wing **A** *of the bridge* 44 5 063 S *drags the stay* 44 5 365 D. *The cam* **C** *of this latter rotates the escapement fixed dog* 44 2 043 T *which gets inserted in the appropriate opening of the teeth-range* **D** *of the slide. The stay* 44 5 365 D *rotates through the cypher entry plate* 44 5 139 R *the escapement movable dog* 43 2 074 Q *also which disengages from the proper escapement stop. Check that the movable dog has a little clearance* **L** *with respect to the rack* **D**.

In this way we have preset the one-step advance of the slide.

d) Still rotate the main shaft; the bridge 44 5 063 S *moves down and its wing* **A** *leaves the stay* 44 5 365 D. *This latter, actuated by its spring moves forward* and, *by allowing the fixed dog and the movable dog returning to rest, it causes the slide moving by one step. This movement should take place immediately after the main racks have reached the rest position.*

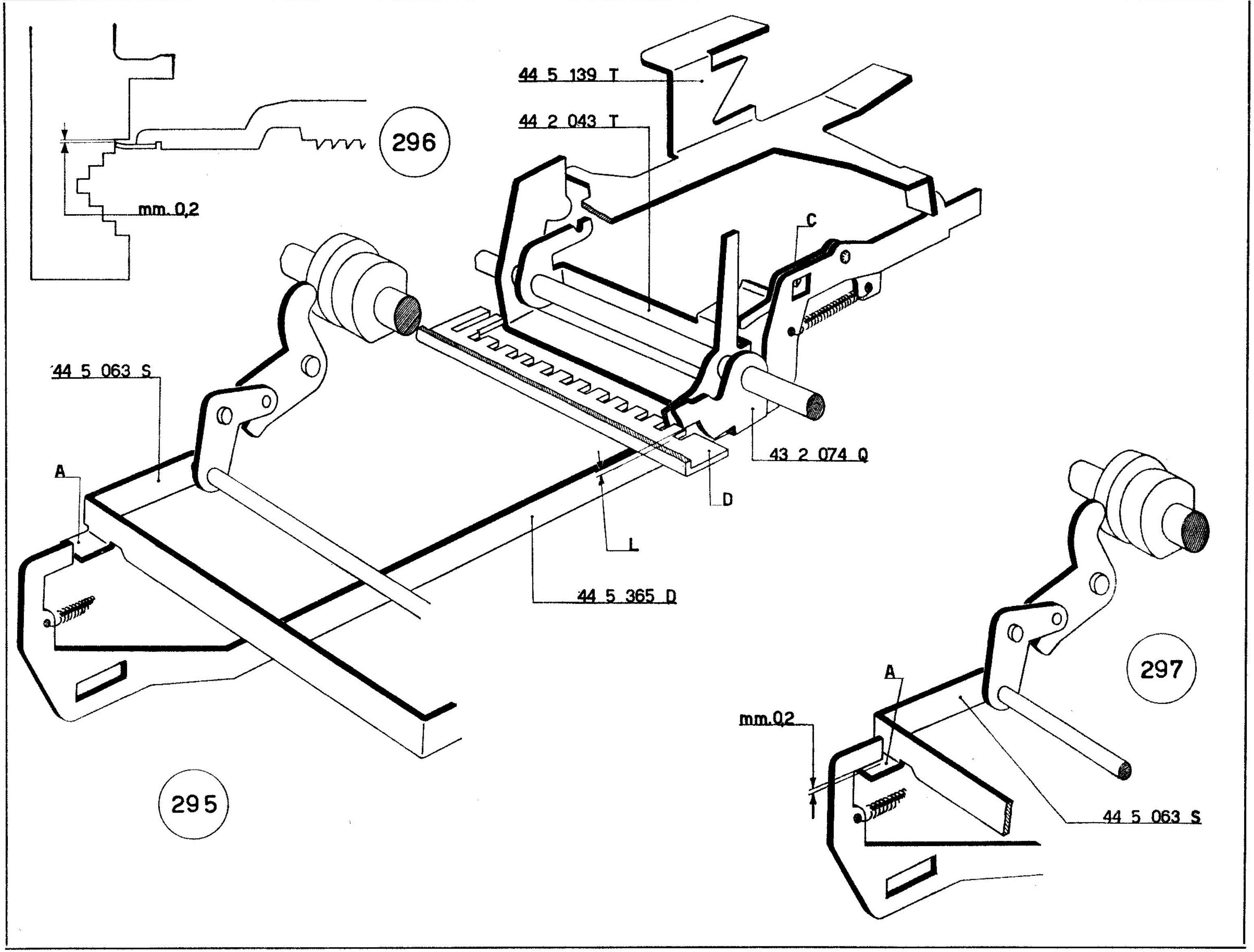
This condition is obtained by bending up or down the wing **A** *of the bridge* 44 5 063 S*; in this way the movement of the slide will be retarded or anticipated.*

e) Enter in the memory the number 90. *Enter a figure and depress the « multiplication control » key. Make the main shaft perform a complete cycle and a further rotation by about* 45°. *Check the minimum clearance of* 0.2 *mm. shown in the figure* 296.

f) Carry on rotating the main shaft and check that the wing **A** *of the bridge* 44 5 063 S *passes under the rear extension of the stay* 44 5 365 D *with a clearance of* 0.2 *mm. (figure* 297*). If this condition is not obtained it will be necessary to check again the adjustment described at point* c*).*

g) Move the machine back to rest.

44 2 043 T	Escapement fixed dog
44 5 063 S	Stroke-counter bridge
44 5 139 T	Cypher entry plate
44 5 365 D	Escapement control stay
43 2 074 Q	Slide stop dog


mm. 0,2
296
44 5 139 T
44 2 043 T
C
44 5 063 S
A
43 2 074 Q
D
L
44 5 365 D
295
A
mm. 0,2
297
44 5 063 S

228 - FIGURE 298

Checking the position of the half-step gauge.

a) Check to have the number 90 in the memory.

b) Enter a figure and depress the « multiplication control » key.

c) Rotate the main shaft until obtaining the maximum rearward travel of the bridge 44 5 063 S *(about* 190°*).*

Check that between the half-step gauge **S** *and the extensions of the memory racks there is a clearance* **L.**

d) Move the main shaft back to rest.

44 2 316 Z	Current-keyboard reciprocal locking rocker
44 4 305 H	Multiplication control key-stem
44 5 063 S	Stroke-counter bridge
44 5 190 T	Locking frame

229 - FIGURE 299

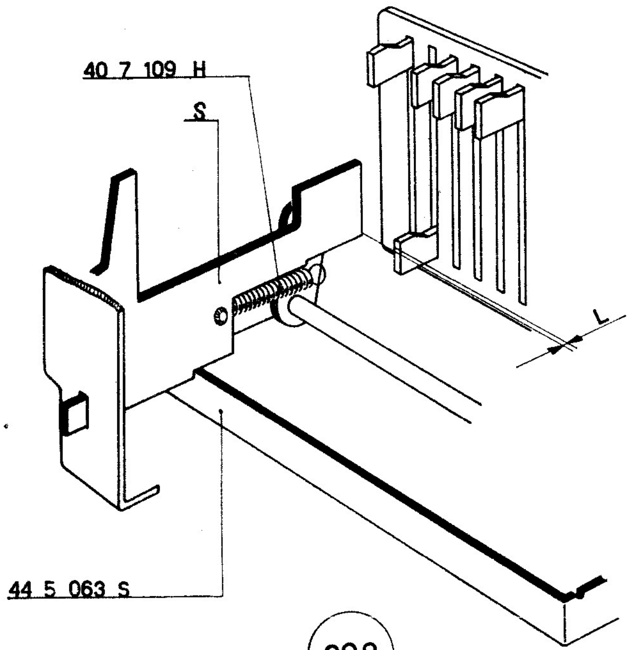
Checking the locking of the keyboard entry with « multiplication control ».

a) Check that the slide it at rest.

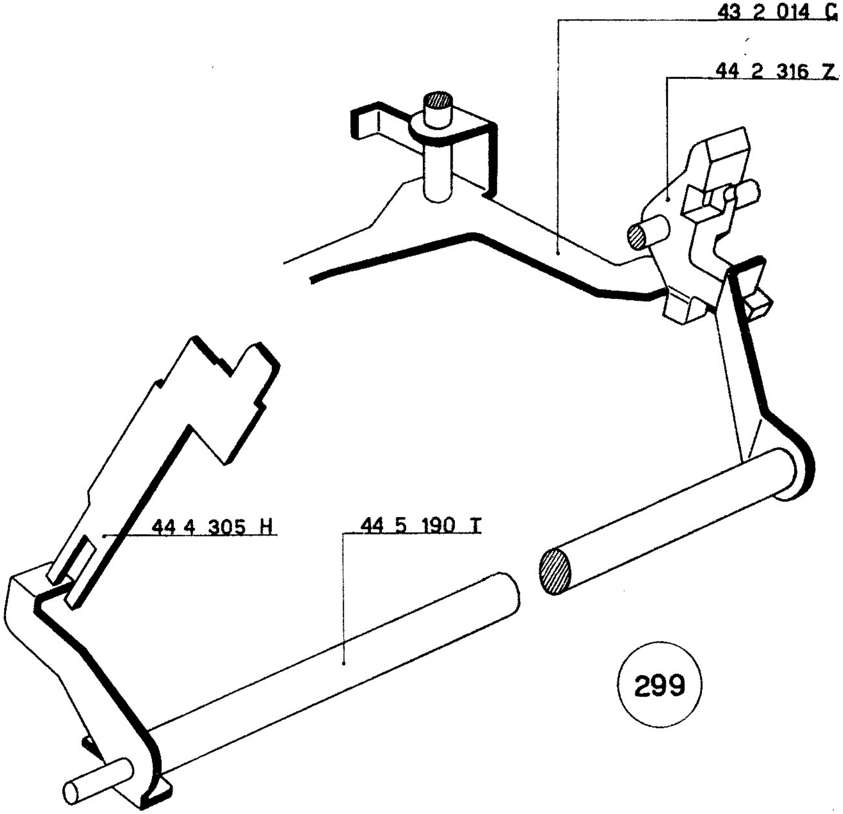
b) Depress the « multiplication control » key.

c) Check that the locking frame 44 5 190 T *has rotated the rocker* 44 2 316 Z *which should interfere the lever* 43 2 014 C. *In this way no entry can be made on the keyboard.*

40 7 109 H	Spring for the gauge of the small multiplier slide
43 2 014 C	Current-keyboard reciprocal locking lever


40 7 109 H
S
L
44 5 063 S

298


43 2 014 C
44 2 316 Z
44 4 305 H
44 5 190 T

299

230 - FIGURE 300

Assembling the total key stay and the totals selecting slider with transfers.

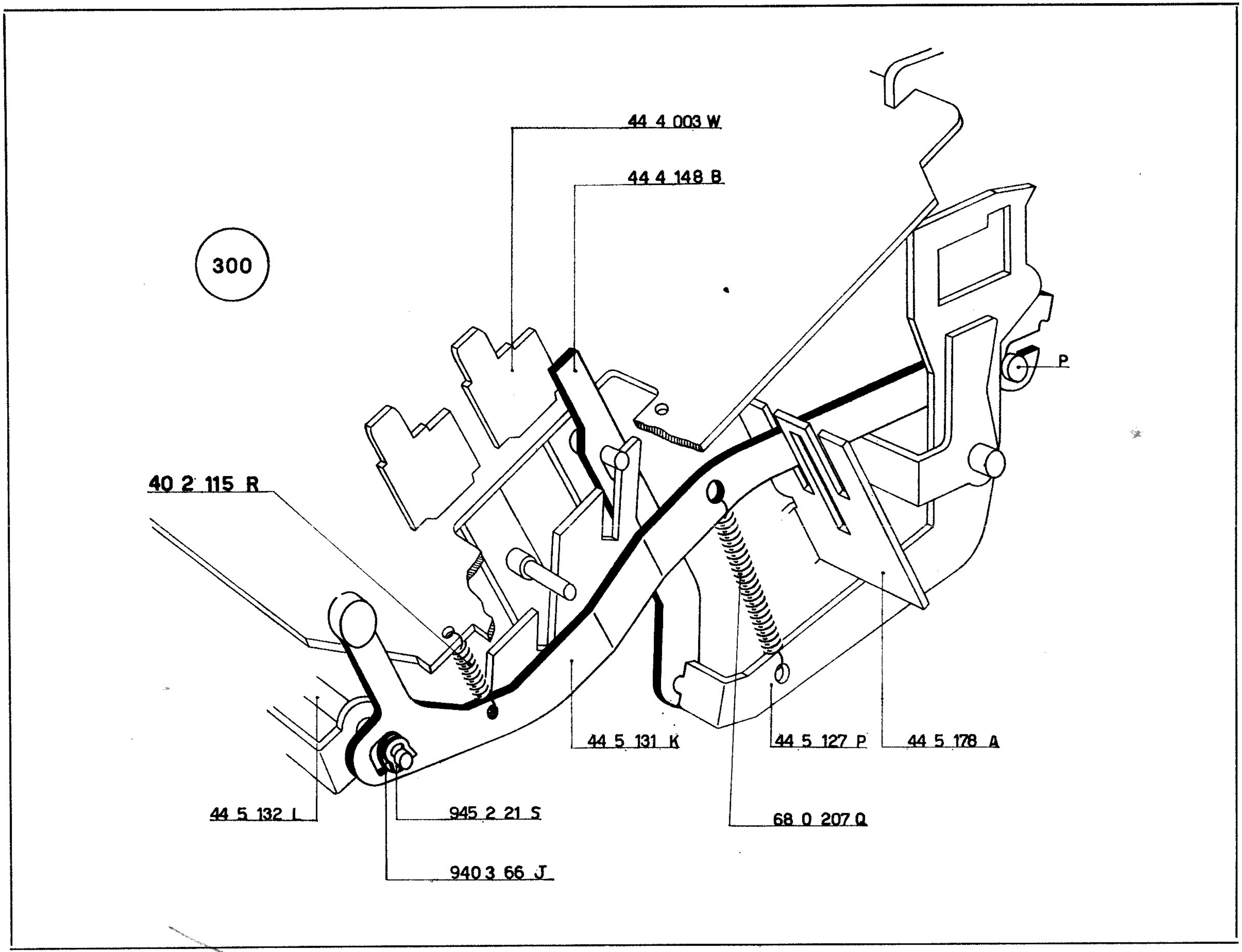
a) Place on the pivot of the stem 44 4 003 W the stay 44 4 148 B which must be connected down to the arm 44 5 127 P.

b) Locate on the shaft 44 5 132 L the totals selecting slider with thansfers 44 5 131 K which must be guided by the small bracket 44 5 178 A. The upper slot of the slider should be inserted in the appropriate pivot **P** riveted on the right external side-plate of the machine. Secure the slide by means of a spring-clip 945 2 21 S and by interposing the washer 940 3 66 J.

c) Between the slider 44 5 131 K and the upper keyboard plate, hook the spring 40 2 115 R.

d) Between the slider 44 5 131 K and the arm 44 5 127 P, hook the spring 68 0 207 Q.

44 4 003 W	Second register total key-stem
44 4 148 B	Servomechanism total key stay
44 5 127 P	Servomechanism totals control arm
44 5 131 K	Totals selecting slider with transfers
44 5 132 L	Shaft of the rod control right arm
44 5 178 A	Right arms guide bracket
40 2 115 R	Spring for 44 5 131 K
68 0 207 Q	Spring for 44 5 131 K - 44 5 127 P
940 3 66 J	Washer
945 2 21 S	Spring-clip


300
44 4 003 W
44 4 148 B
P
40 2 115 R
44 5 131 K
44 5 127 P
44 5 178 A
44 5 132 L
945 2 21 S
68 0 207 Q
940 3 66 J

231 - FIGURE 301

Assembling the tabulation and totals control servomechanism device.

a) In the opening of the arm 44 5 127 P insert the servomechanism selecting rod 44 5 123 K.

b) On the right side-plate of the machine assemble by means of the pivot 44 5 128 Y the servomechanism 44 5 419 U on the pivot **P1** of which should be located the rear slot of the rod 44 5 123 K.

Secure the pivot 44 5 128 Y by means of the nut 938 2 51 D. Secure the servomechanism with the spring-clip 945 3 41 A.

c) Unscrew the pivot 44 5 128 Y and place on it the hook of the servomechanism 44 5 120 U. Screw again the pivot 44 5 128 Y and secure the hook by means of a spring-clip 945 3 41 A.

d) Place on the pivot of the arm 44 4 334 V:

— the servomechanism selecting rod hook 44 6 080 Z

— the servomechanism transmission bracket 44 5 120 W.

Secure with a spring-clip 945 2 21 S.

e) Assemble, as illustrated in the figure, the servomechanism hook rod 44 5 421 N which must be connected to the pivot **P** of the hook 44 5 120 U and secured with a spring-clip 945 2 21 S.

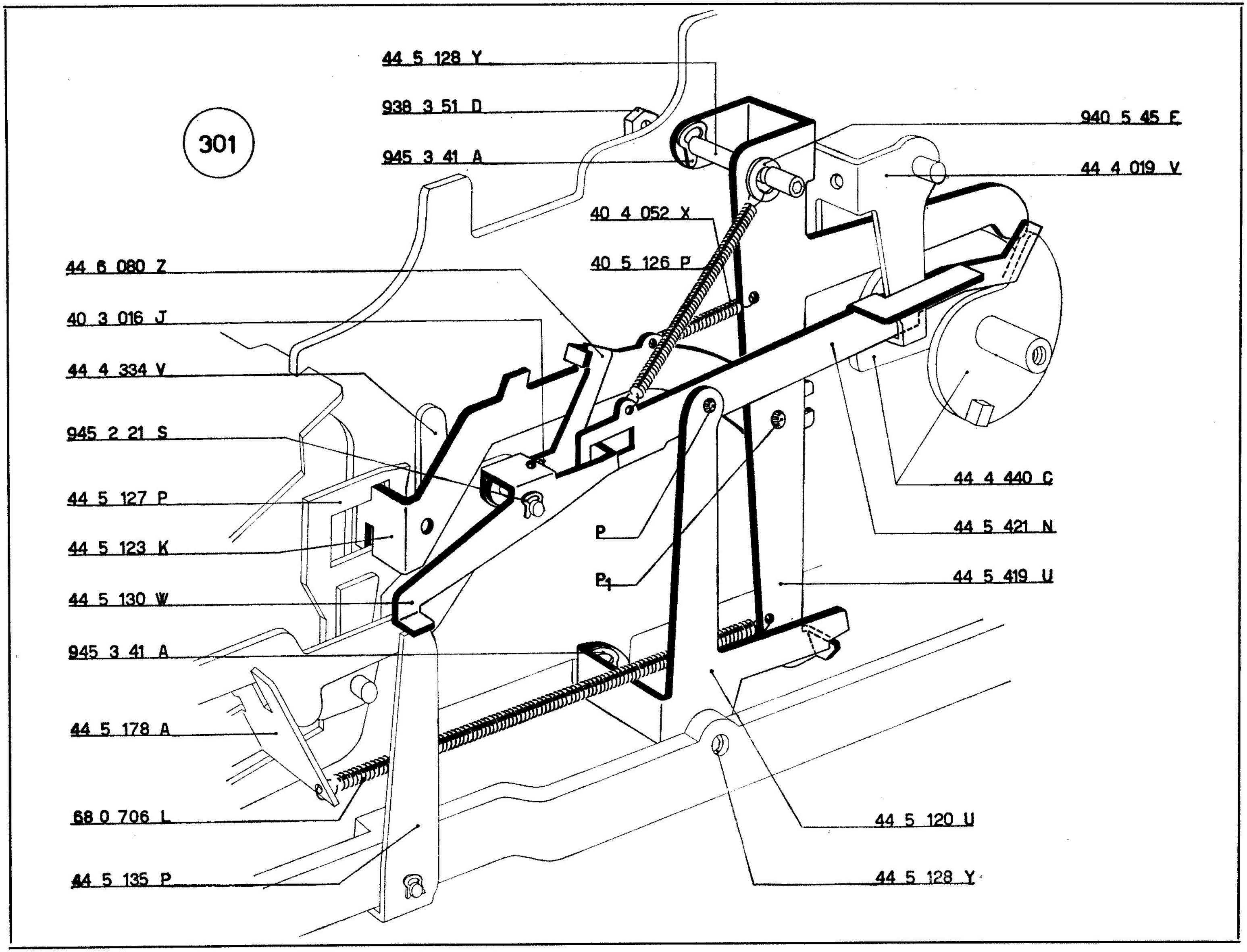
f) Between the hook 44 6 080 Z and the small bracket 44 5 130 W, hook the spring 40 3 016 J.

g) Between the small bracket 44 5 178 A and the servomechanism 44 5 419 U, hook the spring 68 0 706 L.

h) Between the rod 44 5 123 K and the servomechanism 44 5 419 U, hook the spring 40 4 052 X.

i) Between the rod 44 5 121 R and the washer 940 5 45 E, hook the spring 40 5 126 P. The washer should be placed in the appropriate seat of the pivot 44 5 128 Y.

44 4 019 V	Starting lever
44 4 334 V	First register subtraction control right arm
44 4 440 C	Servomechanism restoring and control plate transmission cam
44 5 120 U	Servomechanism hook
44 5 123 K	Servomechanism selecting rod
44 5 127 P	Servomechanism totals control arm
44 5 128 Y	Servomechanism hook pivot
44 5 130 W	Servomechanism transmission bracket
44 5 135 P	Servomechanism control bridge
44 5 178 A	Right arms guide bracket
44 5 419 U	Servomechanism
44 5 421 N	Servomechanism hook rod
44 6 080 Z	Servomechanism selecting rod hook
40 3 016 J	Spring for 44 6 080 Z - 44 5 130 W
40 4 052 X	Spring for 44 5 123 K - 44 5 419 U
40 5 126 P	Spring for 44 5 121 N
68 0 706 L	Spring for 44 5 419 N
938 3 51 D	Hexagonal nut for 44 5 128 Y
940 5 45 E	Washer
945 2 21 S	Spring-clip
945 3 41 A	Spring-clip


301
44 5 128 Y
938 3 51 D
945 3 41 A
940 5 45 E
44 4 019 V
40 4 052 X
40 5 126 P
44 6 080 Z
40 3 016 J
44 4 334 V
945 2 21 S
44 5 127 P
44 5 123 K
44 5 130 W
945 3 41 A
44 5 178 A
68 0 706 L
44 5 135 P
P
P1
44 4 440 C
44 5 421 N
44 5 419 U
44 5 120 U
44 5 128 Y

232 - FIGURE 302

Adjusting the servomechanism control bridge.

a) Move the main shaft to rest.

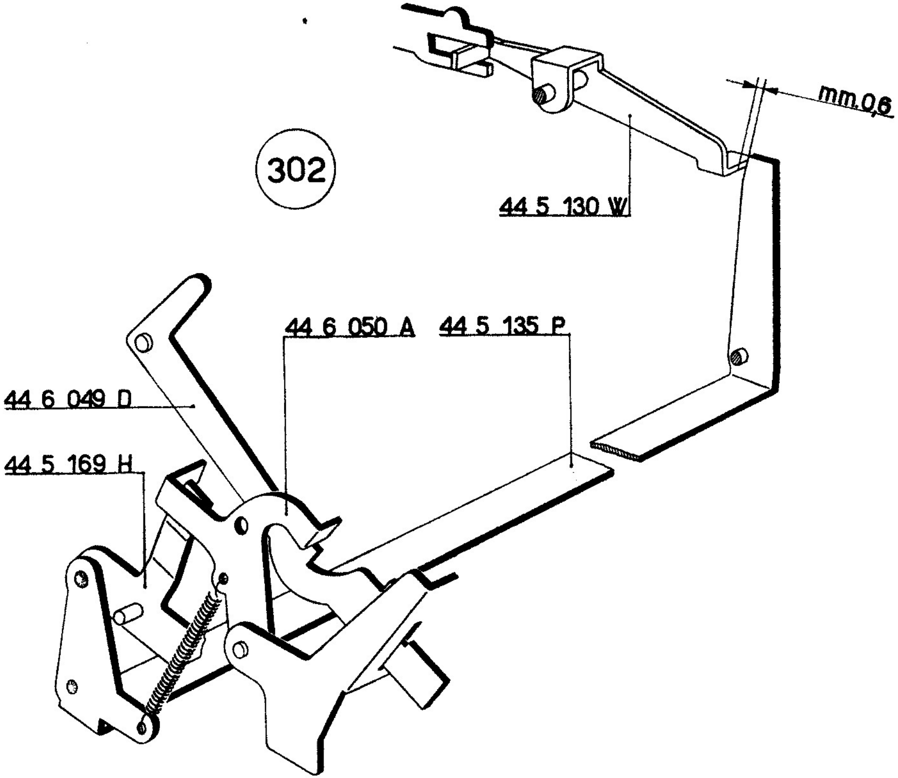
b) Move the automatic button to work.

c) Lower the hook 44 6 049 D *and rotate the bridge* 44 5 169 H *so that it engages with the arm* 44 6 050 A.

In these conditions we should obtain the clearance of 0.6 *mm. shown in the figure. Act if necessary on the bridge* 44 5 135 P.

d) Move the arm 44 6 050 A *back again to rest and rotate the small bracket* 44 5 130 W *which will allow the bridge* 44 5 135 P *returning to rest position.*

44 5 130 W	Servomechanism transmission bracket
44 5 135 P	Servomechanism control bridge
44 5 169 H	Automatic total exclusion bridge
44 6 049 D	Memory engagement control connecting-rod hook
44 6 050 A	Automatic quotient arm


302
mm.0,6
44 5 130 W
44 6 050 A
44 5 135 P
44 6 049 D
44 5 169 H

233 - FIGURES 303 - 304 - 305 - 306 - 307 - 308

Adjusting the automatic tabulation and totals control servomechanism device.

a) In the figure 303 *we have illustrated the automatic tabulation and totals control servomechanism device at rest.*

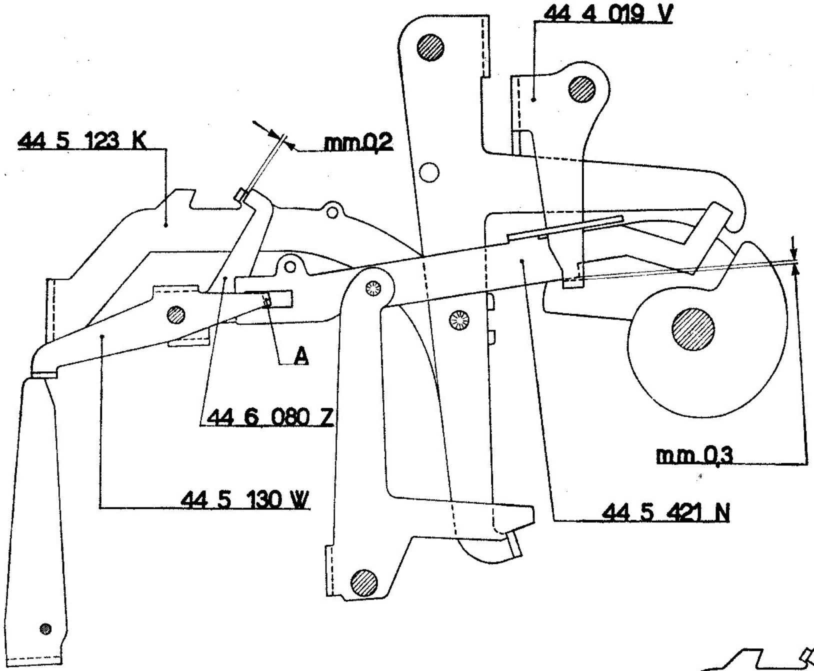
Between the lower extension of the starting lewer 44 4 019 V *and the rod* 44 5 421 N *we must see a minimum clearance of* 0.3 *mm.*

Always at rest, there must be the clearance of 0.2 *mm. between the hook* 44 6 080 Z *and the rod* 44 5 123 K.

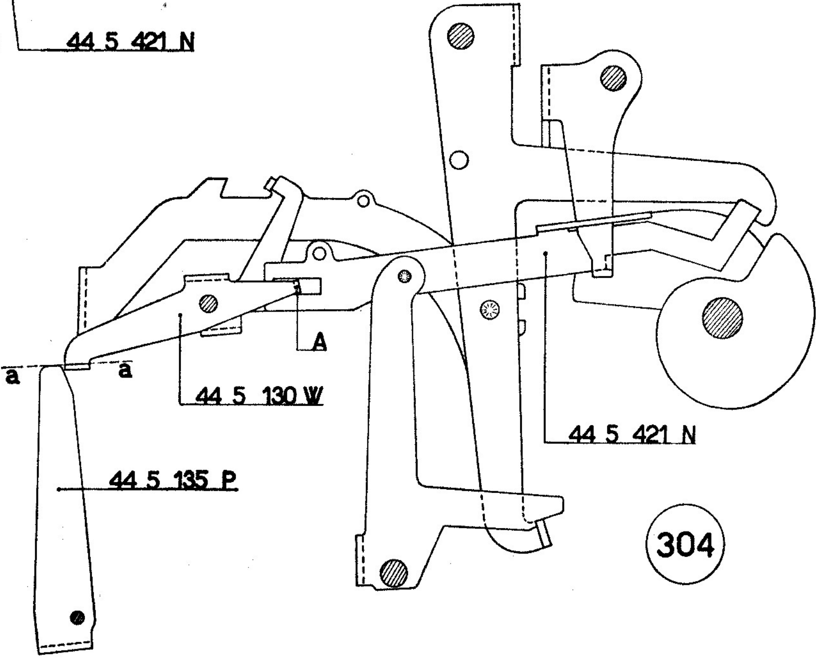
b) Rotate forward the bridge 44 5 135 P. *The front wing of the small bracket* 44 5 130 W *should be straight-lined with the bridge* 44 5 135 P *(line* **a-a** *- figure* 304).

These there conditions are obtained by acting on the extension **A** *of the small bracket* 44 5 130 W.

44 4 019 V	Starting lever
44 5 123 K	Servomechanism selecting rod
44 5 130 W	Servomechanism transmission bracket
44 5 135 P	Servomechanism control bridge
44 5 421 N	Servomechanism hook rod
44 6 080 Z	Servomechanism selecting rod hook


44 4 019 V
44 5 123 K
mm 0,2
A
44 6 080 Z
44 5 130 W
mm 0,3
44 5 421 N

303


A
a
a
44 5 130 W
44 5 421 N
44 5 135 P

304

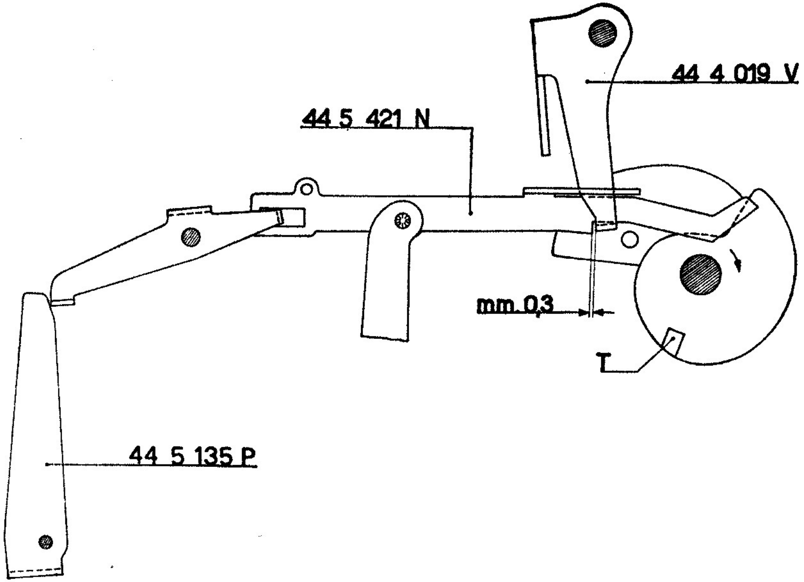
c) Move the main shaft of the machine to rest. Rotate forward the bridge 44 5 135 P *(figure* 305). *Depress an add key and check that there is the clearance of* 0.3 *mm. shown in the figure* 305. *Act if necessary on the starting lever* 44 4 019 V.

44 4 019 V	Starting lever
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam

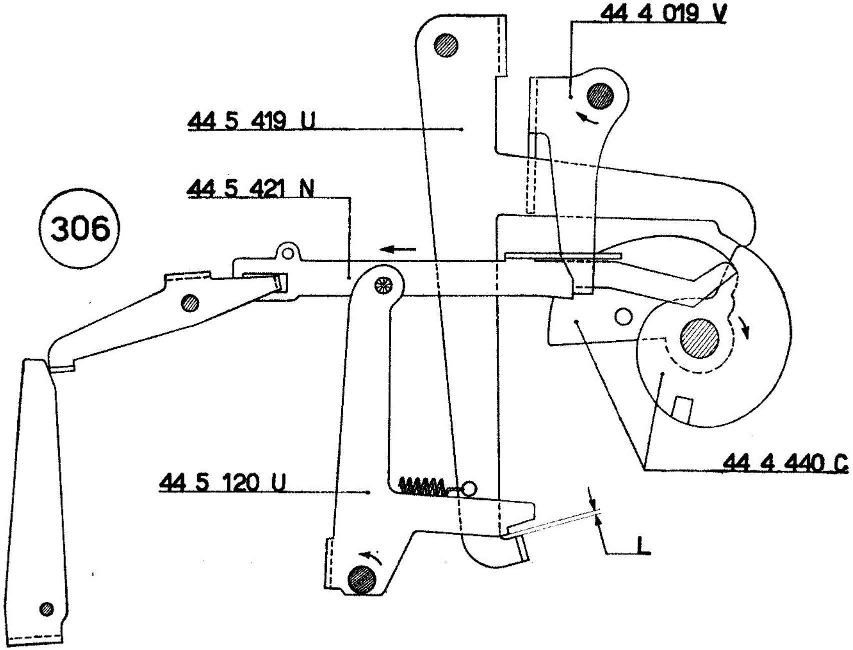
d) Input the figure 1 *in the memory and set the automatic total. Enter the figure* 1 *and depress the « multiplication control » key. Rotate the main shaft until the cam* 44 4 440 C *moves to the position illustrated in the figure* 306. *Check that there is the clearance* **L** *shown in the same figure* 306. *Check again if necessary the adjustment described at point* c).

44 5 120 U	Servomechanism hook
44 5 419 U	Servomechanism
44 5 421 N	Servomechanism hook rod

305


44 4 019 V
44 5 421 N
mm 0,3
T
44 5 135 P

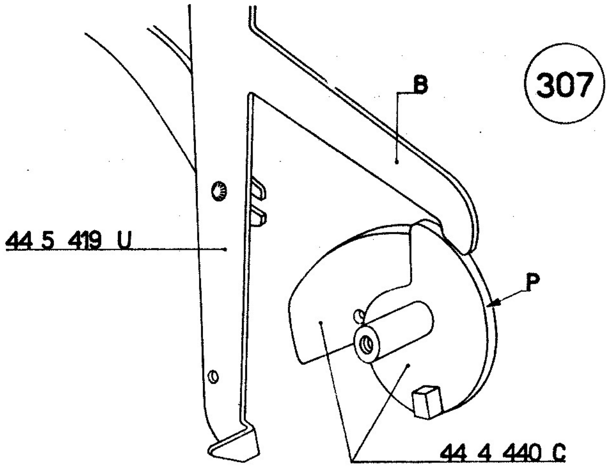
306

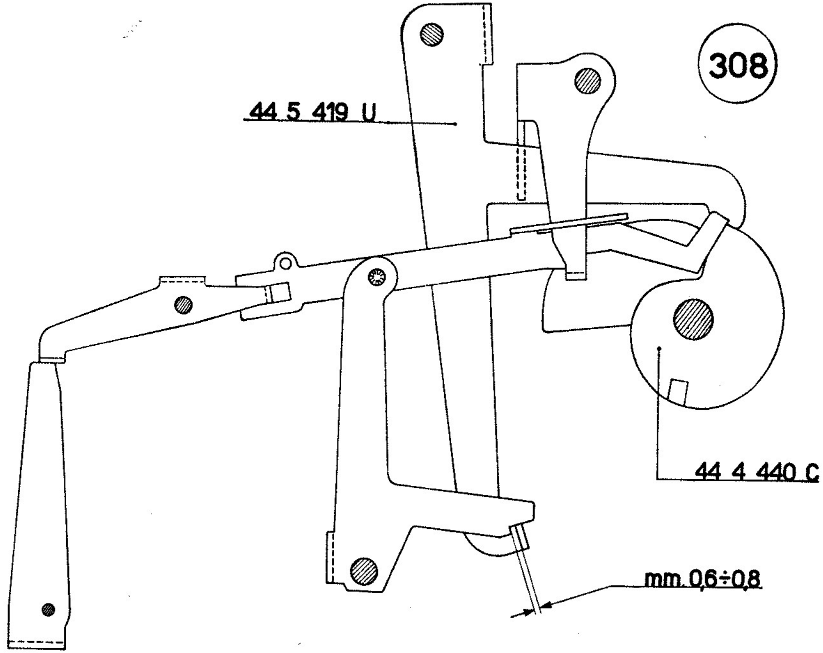

44 4 019 V
44 5 419 U
44 5 421 N
44 4 440 C
44 5 120 U
L

e) Complete the cycle to control the automatic total. Carry on rotating the main shaft and check that the arm **B** *of the servomechanism* 44 5 419 U *is centered with respect to the profile* **P** *of the cam* 44 4 440 C (*figure* 307). *Act if necessary on the arm* **B.**

f) Move at last the main shaft to the position illustrated in the figure 308. *Check the clearance of* 0.6÷0.8 *mm. shown in the same figure. Act if necessary on the arm of the servomechanism* 44 5 419 U *which rests on the cam* 44 4 440 C.

44 4 440 C	Servomechanism bridge restoring and control plate transmission cam
44 5 419 U	Servomechanism


307
B
44 5 419 U
P
44 4 440 C


308
44 5 419 U
44 4 440 C
mm 0,6÷0,8

234 - FIGURE 309

Assembling the printing control bridge of the sign C.

a) Assemble the printing control bridge of the sign C 52 6 121 A as illustrated in the figure.

b) Between the bridge and the indicator drum support, hook the spring 42 4 040 S.

42 4 040 S	Spring for 52 6 121 S
52 6 020 L	Hook-bridge restoring lever

235 - FIGURES 310 and 311

Adjusting the angular position of the crank 52 6 020 L.

a) *Move the main shaft of the machine to rest.*

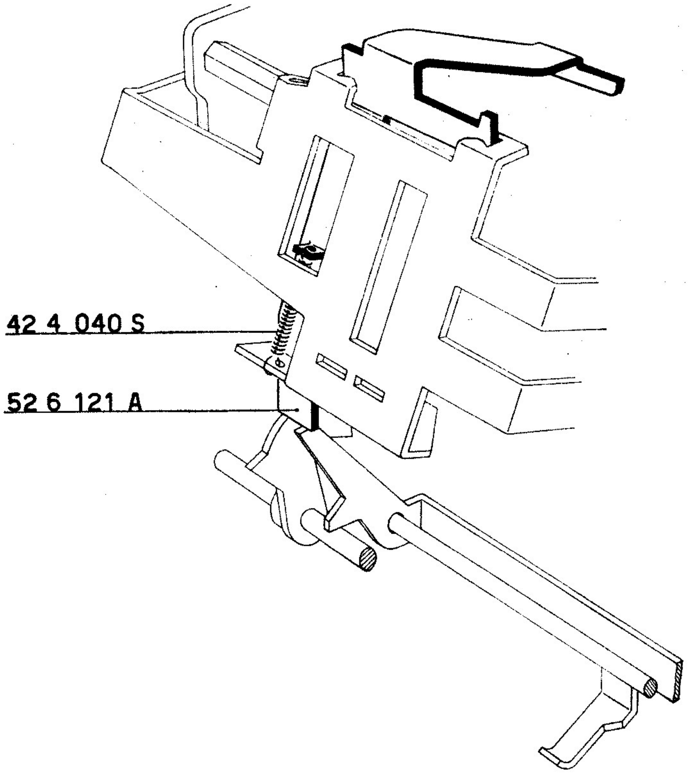
b) *Adjust the angular position of the crank* 52 6 020 L *so that*:

— *at rest we have the clearance* **L** *shown in the figure* 310

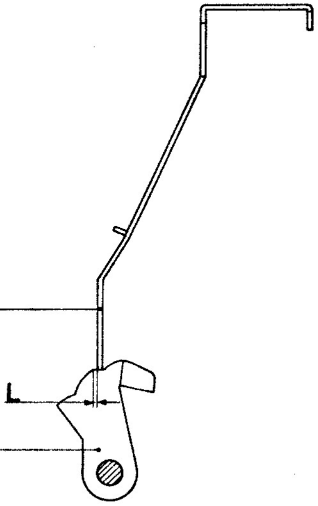
— *we have, in a credit balance, the same clearance* **L** *shown in the figure* 311.

52 6 121 A	Printing control bridge of the sign C

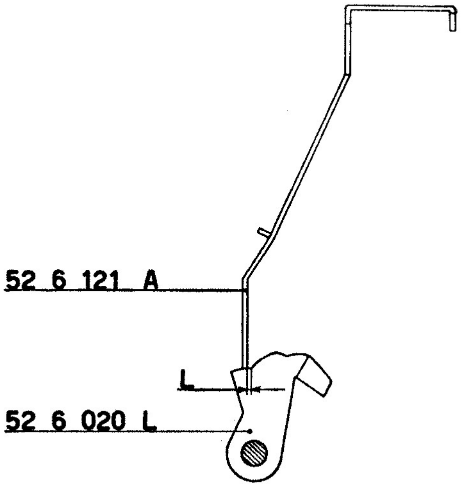
309


42 4 040 S
52 6 121 A

310


52 6 121 A
L
52 6 020 L

311


52 6 121 A
L
52 6 020 L

236 - FIGURE 312

Adjusting the position of the circular transmission exclusion control bridge.

a) Move the main shaft of the machine to rest.

b) With the bridge 44 6 059 F *engaged with the tooth* **A** *of the bridge* 44 6 060 C *we should have the clearance of* 0.1 *mm. shown in the figure.*

c) Rotate in the direction of the arrow the bridge 44 6 060 C *to release the bridge* 44 6 059 F *which will go resting on the arm* **B** *of the bridge* 44 6 060 C. *In these conditions the opening* **V** *of the small plate* **P** *should be centered with respect to the sector* **S** *of the circular transmission.*

d) The conditions described at point b) *and* c) *are obtained by acting suitably on the arm* **B** *of the bridge* 44 6 060 C.

44 5 418 T	Small slide dragging comb
44 6 022 J	Quotient slide

237 - FIGURE 313

Adjusting the centering of the quotient slide.

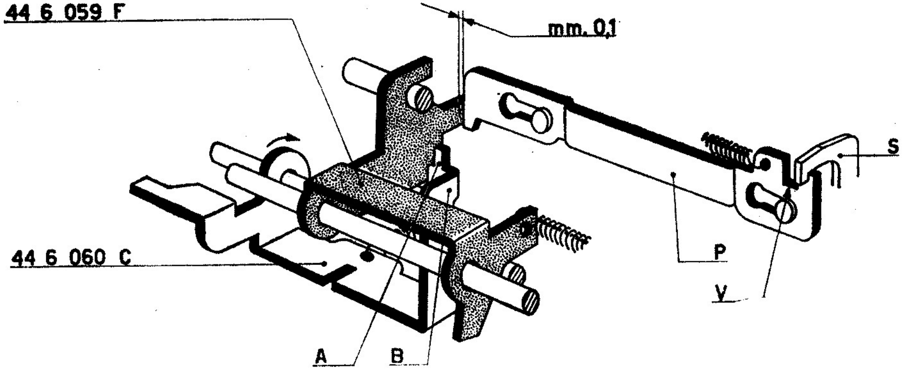
a) Move the main shaft to rest.

b) Enter a figure and check that the arm **A** *of the small slide* 44 6 022 J *is quite centered with respect to the first slot* **I** *of the comb* 44 5 418 T.

c) Enter other ten figures and check that the same arm **A** *is quite centered with respect to the eleventh slot of the same comb.*

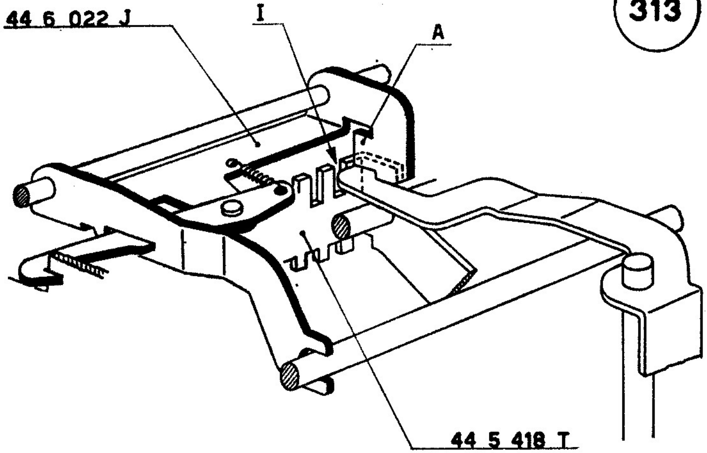
b) The described conditions are obtained by acting suitably on the same arm **A**.

44 6 059 F	Circular transmission exclusion control bridge
44 6 060 C	Hook-bridge


44 6 059 F
mm. 0,1
S
44 6 060 C
P
V
A
B

312

313


44 6 022 J
I
A
44 5 418 T

238 - FIGURES 314 - 315 - 316 - 317 - 318 - 319 - 320 - 321 - 322 - 323

Adjusting the division control cinematics.

a) Clear the second register.

b) Enter 111 *and add it in the second register.*

c) Enter 1 *and depress the « division control » key. In these conditions check that the extension* **A** *of the anchor* 44 6 015 K *engages surely with the bent wing* **B** *of the lever* 44 6 011 P (*figure* 314).

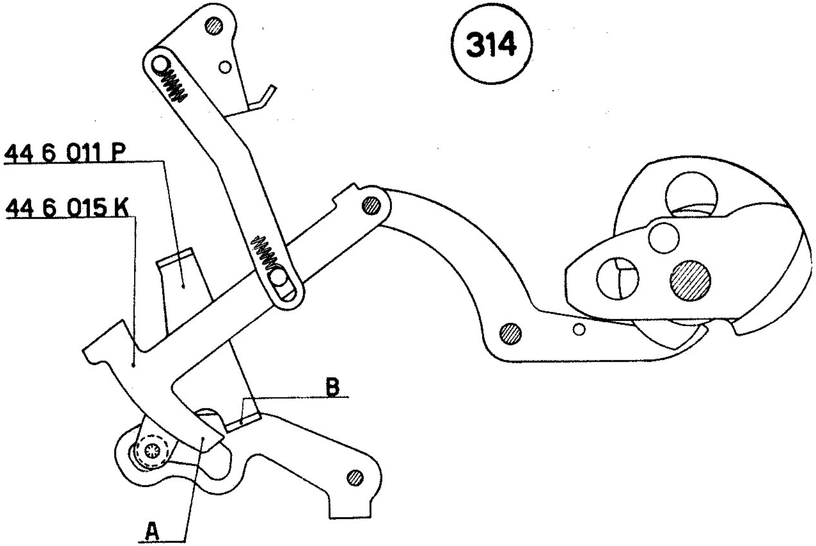
d) Make the main shaft perform the subtotal cycle thus causing the automatic tabulation.

In these conditions we should have (figure 315):

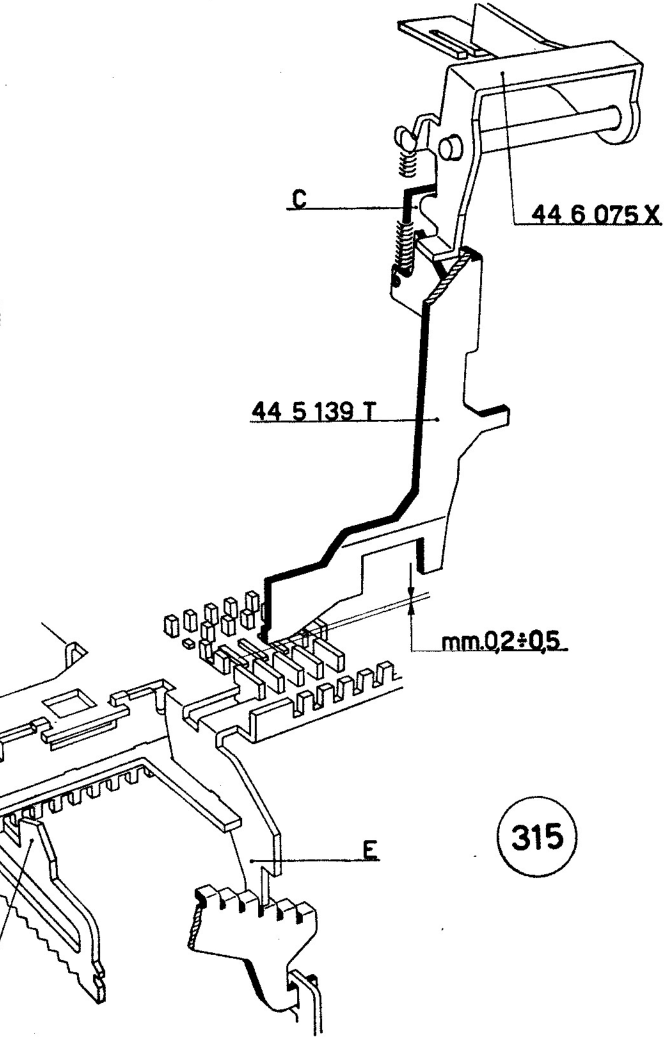
— *a clearance of* 0.2÷0.5 *mm. between the cypher entry plate* 44 5 139 T *and the stops of the zero set. This conditions is obtained by acting on the wing* **C** *of the entry plate*:

— *the centering of the racks* **D** *with respect to the teeth of the comb* **P** *of the slide. This condition is obtained by acting suitably on the extension* **E** *of the slide.*

44 5 139 T	Cypher entry plate
44 6 011 P	Arm holding plate control lever
44 6 015 K	Automatic tabulation control anchor
44 6 075 X	Cypher entry plate control bridge



314
44 6 011 P
44 6 015 K
B
A



C
44 6 075 X
44 5 139 T
mm.0,2÷0,5
P
315
E
D

e) Start the first division cycle and see that the pawl **N** *of the division connecting-rod* 44 6 334 X *passes above the arm* 44 6 033 M *with a little clearance* **L** *(figure* 316). .

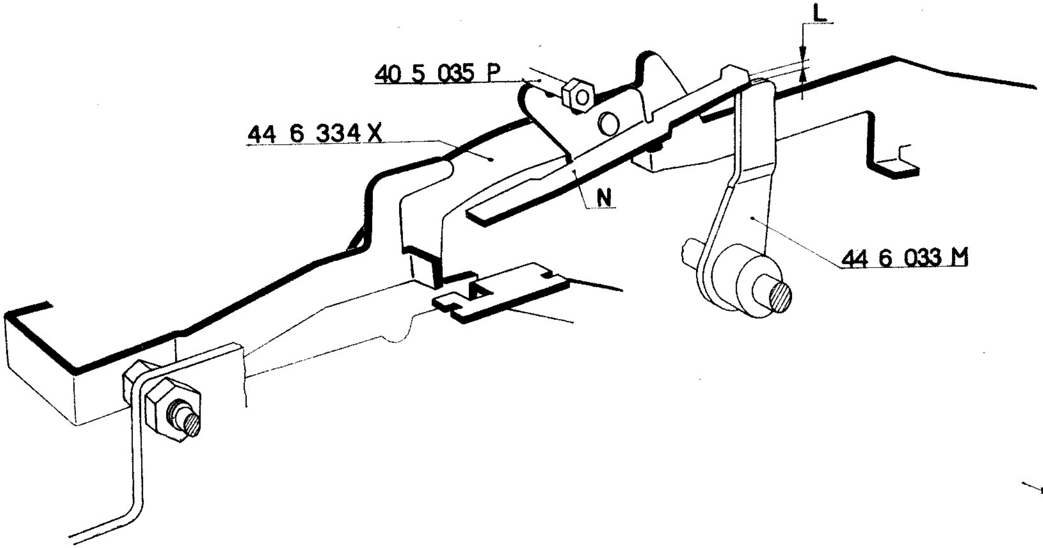
The condition is obtained by adjusting suitably the position of the pivot 40 5 035 P.

f) carry on the first cycle until the main shaft makes a rotation by about 90°. *In these conditions we should have (figure* 317):

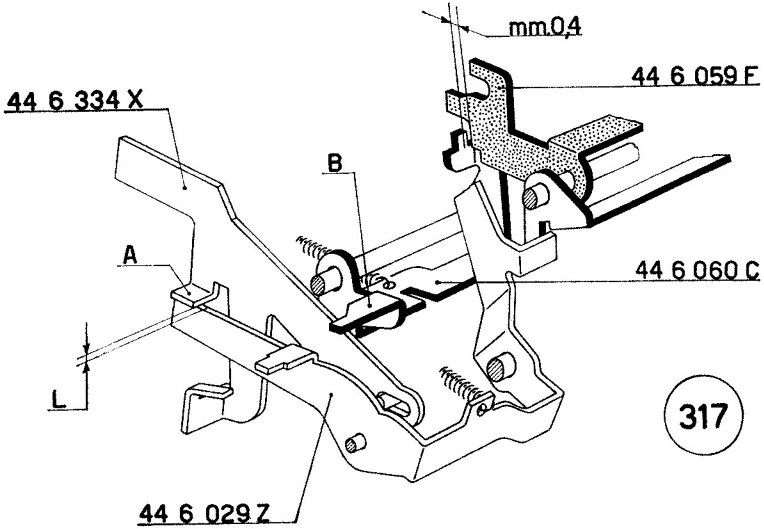
— *a clearance* **L** *between the extension of the bridge* 44 6 029 Z *and the bent wing* **A** *of the division connecting-rod* 44 6 334 X

— *the clearance of* 0.4 *mm. shown in the same figure. This condition is obtained by acting suitably on the bent wing* **B** *of the bridge* 44 6 060 C.

44 6 029 Z	Division connecting-rod control exceeding bridge
44 6 033 M	Division stop control arm
44 6 059 F	Circular transmission exclusion control bridge
44 6 060 C	Hook-bridge
44 6 334 X	Division control connecting-rod with stop pawl
40 5 035 P	Pivot


40 5 035 P
44 6 334 X
N
L
44 6 033 M

316


mm 0,4
44 6 059 F
44 6 334 X
B
A
44 6 060 C
L
44 6 029 Z

317

g) Complete the first cycle and do the second also. Start the third cycle and rotate the main shaft by 45° *about.*

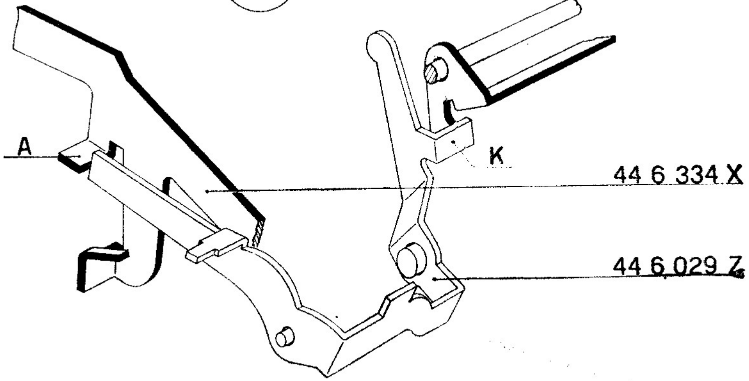
In these conditions check that the extension of the bridge 44 6 029 Z *is quite centered vertically with respect to the bent wing* **A** *of the division connecting-rod* 44 6 334 X *(figure* 318).

What has been now described and the condition illustrated in the first point of the paragraph f) *are obtained by acting suitably on the wing* **K** *of the bridge* 44 6 029 Z.

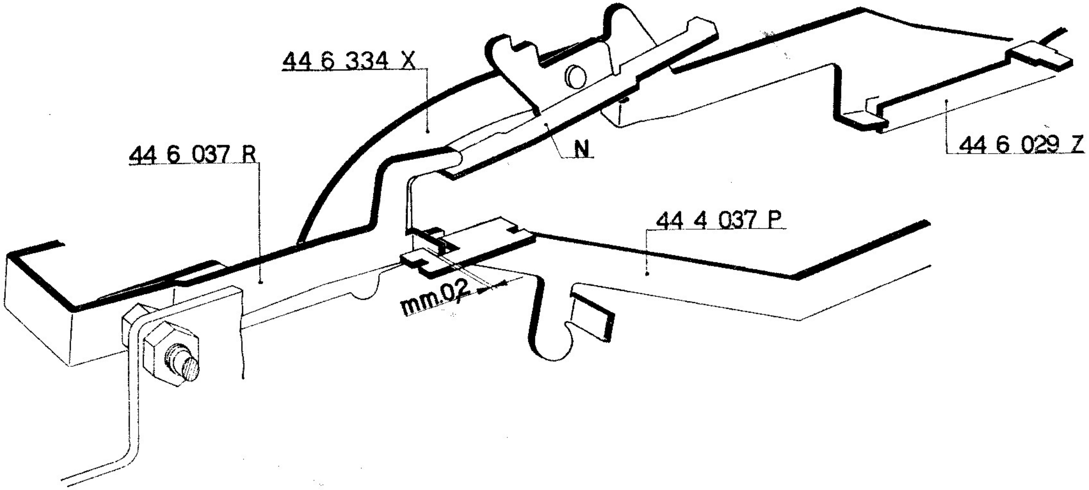
Always in the same conditions, check the clearance of 0.2 *mm. shown in the figure* 319. *This is obtained by acting on the bent wing of the hook* 44 6 037 R.

44 4 037 P	Printing and repeat slider restoring plate
44 6 029 Z	Division connecting-rod control exceeding bridge
44 6 037 R	Partial restoring printing control hook
44 6 334 X	Division connecting-rod with stop pawl

318


A
K
44 6 334 X
44 6 029 Z

319


44 6 334 X
44 6 037 R
N
44 6 029 Z
44 4 037 P
mm.0,2

h) Complete the third cycle; do also the fourth, the fifth and the sixth cycle.

Start the seventh cycle and rotate the main shaft by about 450.

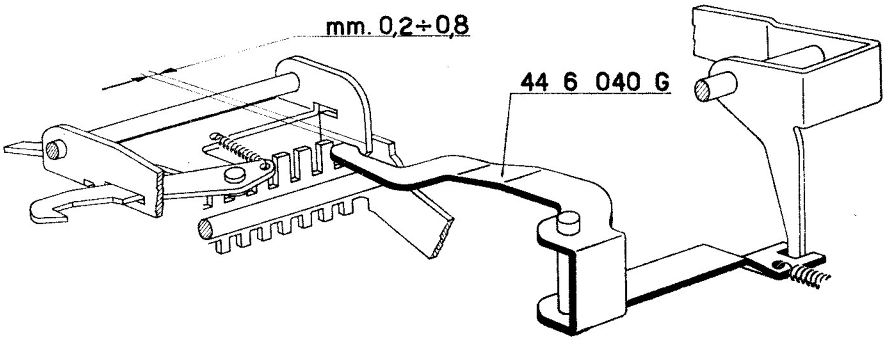
In these conditions we should have the clearance of 0.2÷0.8 *mm. shown in the figure* 320. *This is obtained by acting suitably on the bridge* 44 6 040 G.

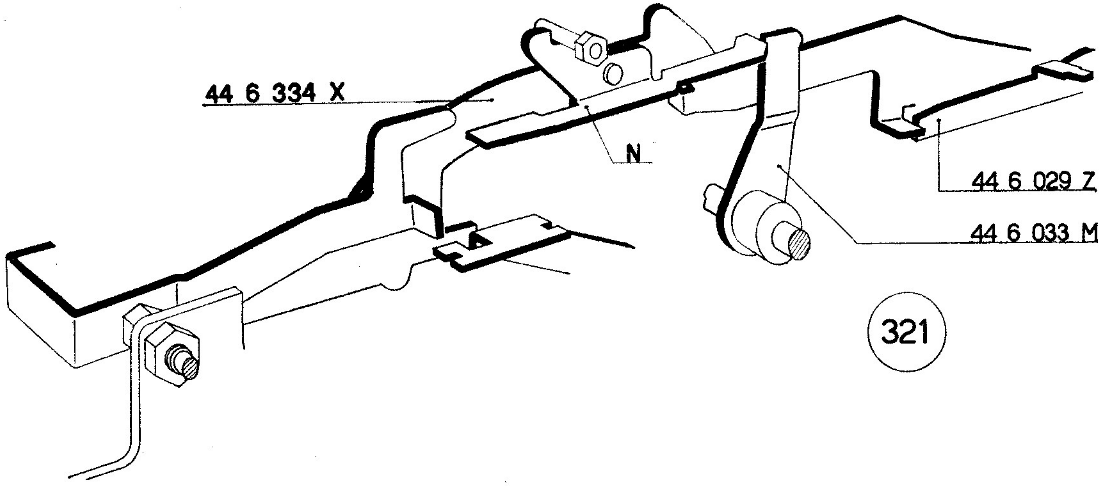
i) Complete the seventh cycle; do the eighth. Start the ninth cycle and rotate the main shaft by about 180°.

Check that the arm 44 6 033 M *engages all the thickness of the pawl* **N** *of the division connecting-rod* 44 6 334 X (*figure* 321).

44 6 029 Z	Division connecting-rod control exceeding bridge
44 6 033 M	Division stop control arm
44 6 040 G	Partial restoring and printing control hook transmission bridge
44 6 334 X	Division connecting-rod with stop pawl

320


mm. 0,2÷0,8
44 6 040 G


44 6 334 X
N
44 6 029 Z
44 6 033 M

321

l) Complete the ninth cycle. Check that the ancor 44 6 015 K *takes the position illustrated in the figure* 322 *with respect to the wing* **H** *of the lever* 44 6 011 P.

This position and that described at point c) *depend upon the adjustment done at paragraph* 195.

44 6 011 P Arm holding plate control lever

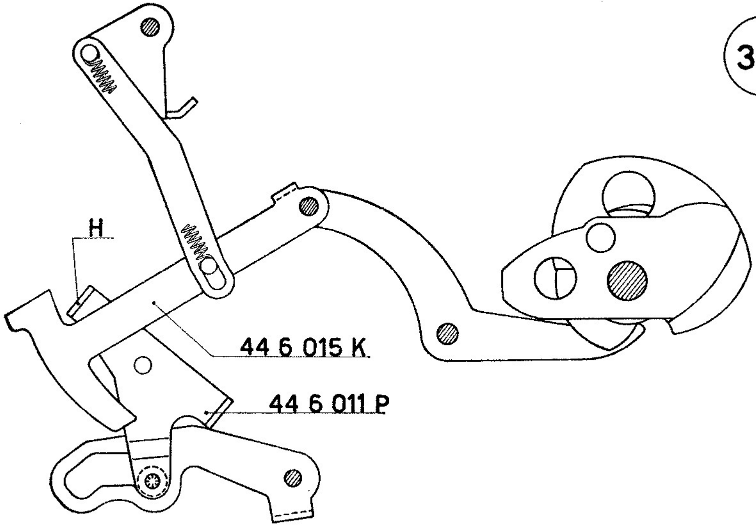
m) Perform the tenth cycle (quotient reading) and check that the anchor 44 6 015 K *moves surely to rest the lever* 44 6 011 P *(figure* 323).

Act if necessary on the wing **H** *of the lever.*

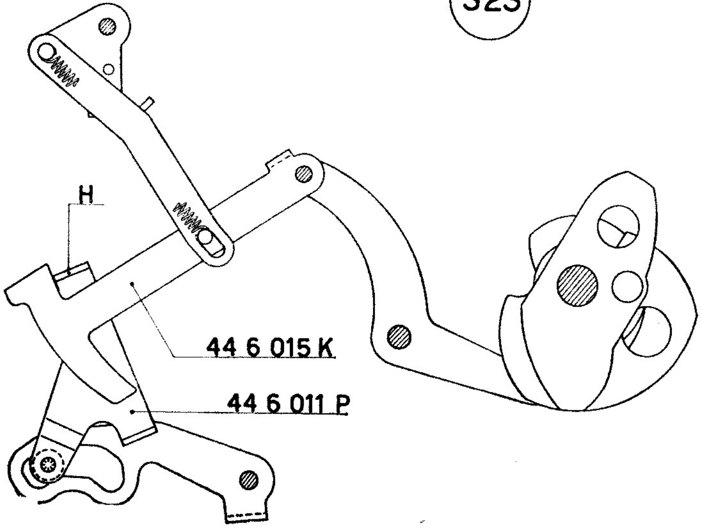
n) Complete the division.

44 6 015 K Automatic tabulation control anchor

322


H
44 6 015 K
44 6 011 P

323


H
44 6 015 K
44 6 011 P

239 - FIGURE 324

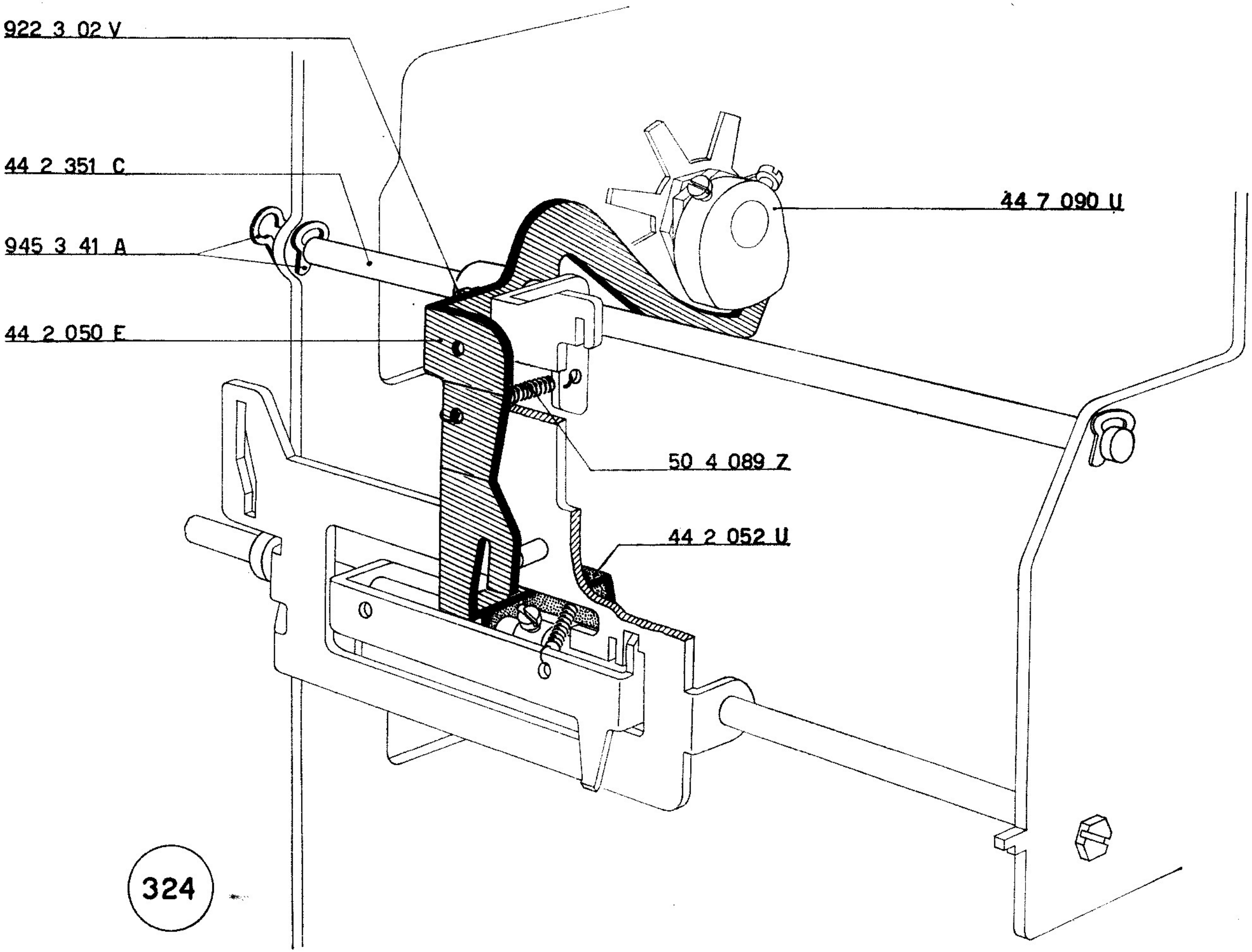
Assembling the slide antirebounding control lever.

a) Insert in the appropriate hole of the right external side-plate of the machine the shaft 44 2 351 C on which should be placed the control lever 44 2 050 E with the screw 922 3 02 V.

b) Secure the shaft 44 2 351 C by means of two spring-clips 945 3 41 A .

c) Hook the spring 50 4 089 Z between the lever 44 2 050 E and the small escapement plate.

44 2 050 E	Pawl control lever
44 2 052 U	Slide antirebounding pawl
44 2 351 C	Shaft of the lever 44 2 050 E
44 7 090 U	Printing cam
50 4 089 Z	Spring for 44 2 050 E
922 3 02 V	Screw for 44 2 050 E
945 3 41 A	Spring-clip for 44 2 351 C


922 3 02 V
44 2 351 C
945 3 41 A
44 2 050 E
44 7 090 U
50 4 089 Z
44 2 052 U

324

240 - FIGURES 325 and 326

Final adjustment of the slide antirebounding.

a) Move the slide to rest.

b) Adjust the axial position of the ring 44 6 058 E *so that the tooth of the pawl* 44 2 052 U *takes the position illustrated in the figure* 325 (*mm.* 0.2).

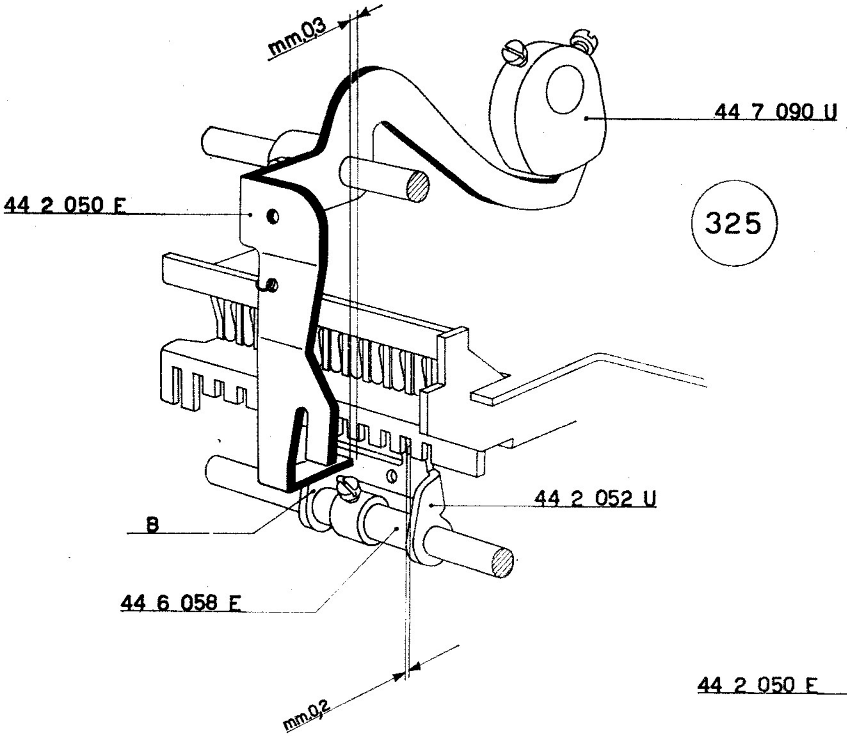
c) Adjust the axial position of the lever 44 2 050 E *which should not interfer with the arm* **B** *of the pawl* 44 2 052 E (*figure* 325).

Tighten the screw of the lever.

d) Move the main shaft of the machine to rest. In these conditions the lever 44 2 050 E *controlled by the cam* 44 7 090 U *must be at* 0.3 *mm. from the pawl* 44 2 052 U (*figure* 326). *Act if necessary on the lever* 44 2 050 E.

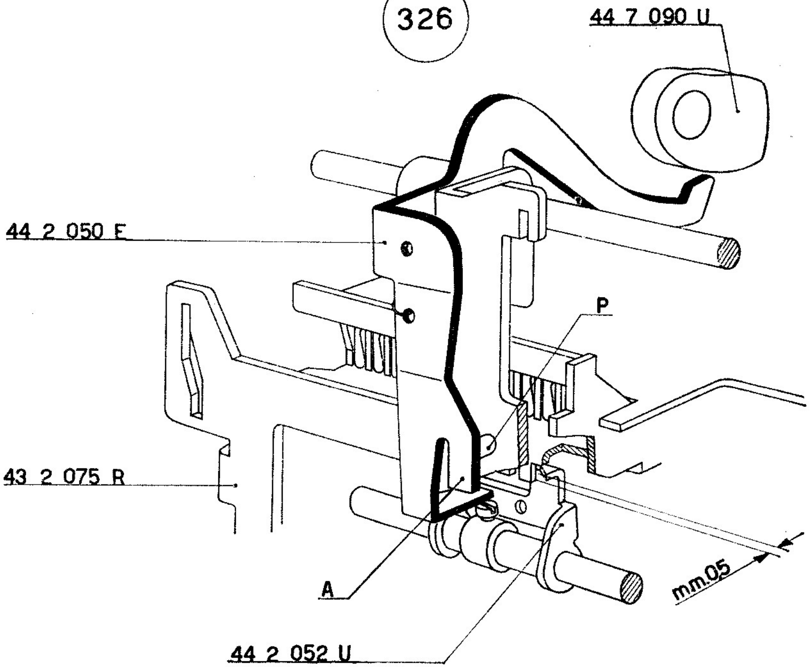
e) Rotate the main shaft of the machine so that the cam 44 7 090 U *leaves the lever* 44 2 050 E. *This latter will move resting on the pivot* **P** *of the small plate* 43 2 075 R. *In these conditions we should have the clearance of* 0.5 *mm. shown in the figure* 326. *Act if necessary on the wing* **A** *of the lever* 44 2 050 E.

44 2 050 E	Pawl control lever
44 2 052 U	Slide antirebounding pawl
44 6 058 E	Antirebounding pawl stop ring
44 7 090 U	Printing cam
43 2 075 R	Slide guide and escapement plate


mm.0,3
44 7 090 U
44 2 050 E
44 2 052 U
B
44 6 058 E
mm.0,2

325

326


44 7 090 U
44 2 050 E
P
43 2 075 R
A
mm.0,5
44 2 052 U

241 - FIGURE 327

Assembling the printing control plate.

a) In the slots of the two internal side-plates of the machine place the printing control plate 44 7 387 W. In its fork insert the pivot **P** of the transmission lever 44 4 038 Y.

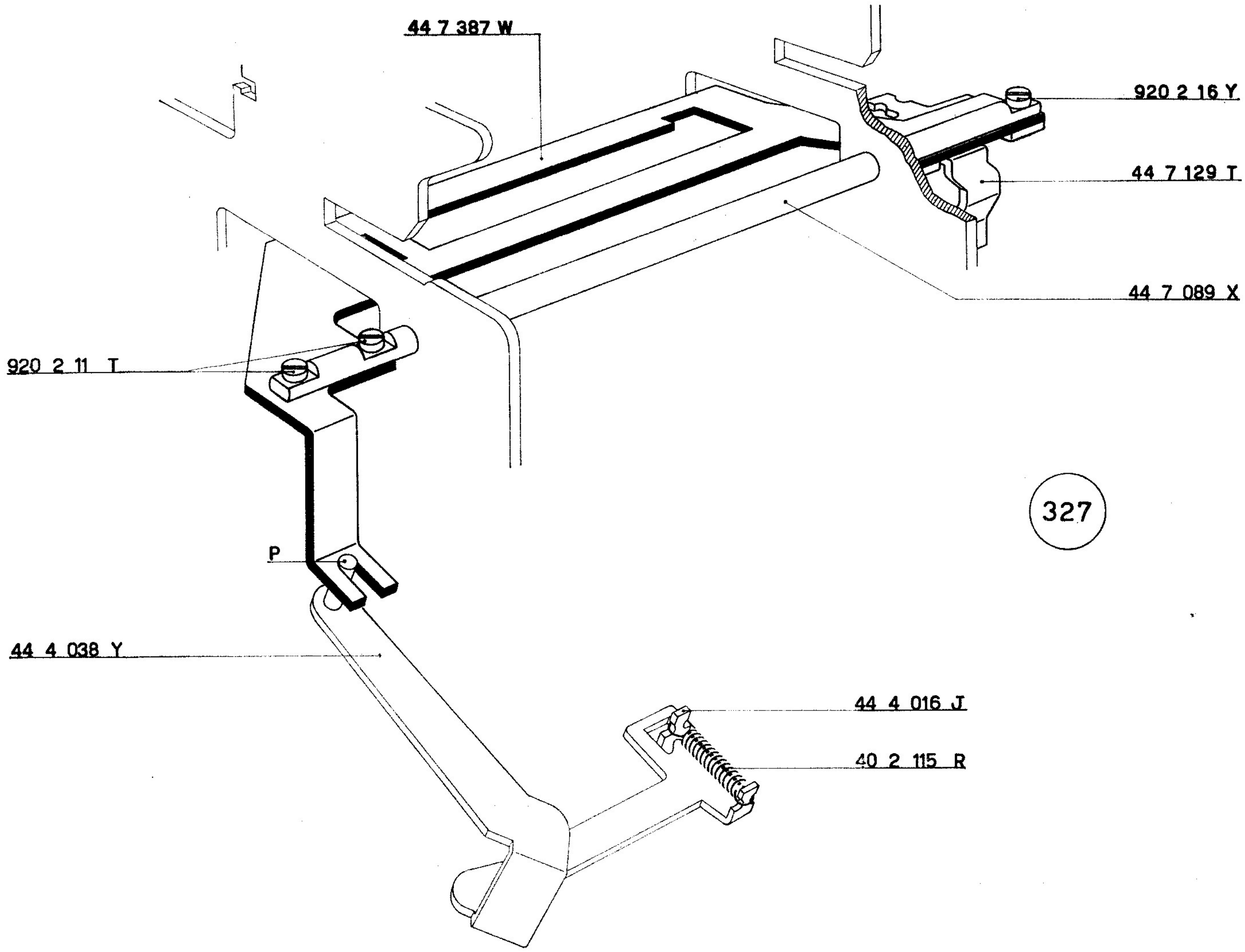
b) In the appropriate guide holes of the two internal side-plates of the machine locate correctly orientated the shaft of the printing control plate 44 7 089 X. Assemble as illustrated in the figure the lever 44 7 129 T.

c) Secure the plate 44 7 387 W to the shaft 44 7 089 X by means of two screws 920 2 11 T.

d) Secure the plate 44 7 387 W and the lever 44 7 129 T to the shaft 44 7 089 X by means of two screws 920 2 16 Y.

e) Between the transmission lever 44 4 038 Y and the printing slider 44 4 016 J, hook the spring 40 2 115 R.

44 4 016 J	Printing slider
44 4 038 Y	Printing control plate transmission lever
44 7 089 X	Printing control plate shaft
44 7 129 T	Printing plate release control lever
44 7 387 W	Printing control plate
40 2 115 R	Spring for 44 4 038 Y - 44 4 016 J
920 2 11 T	Securing screw for 44 7 387 W
920 2 16 Y	Securing screw for 44 7 387 W and 44 7 129 T


44 7 387 W
920 2 16 Y
44 7 129 T
44 7 089 X
920 2 11 T
P
44 4 038 Y
44 4 016 J
40 2 115 R
327

242 - FIGURES 328 and 329

Preparing the printing selection unit.

a) Hook the springs 40 3 016 J:
— to the 13 printing control hooks 44 7 073 W
— to the two special signs printing control hooks 44 7 076 Z and 44 7 135 R
— to the date printing hook 44 7 006 U
— to the printing control hook with sign X 44 7 128 S.

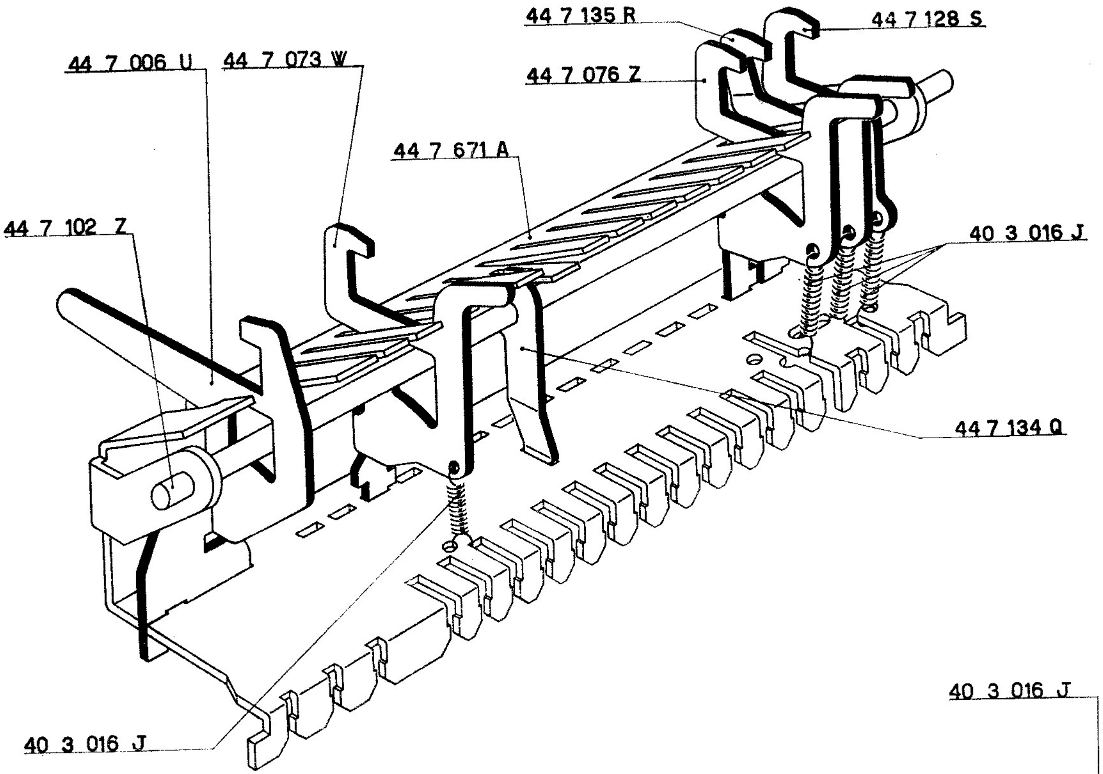
b) In the appropriate guide slots of the comb 44 7 671 A place successively:
— the printing hook 44 7 006 U
— the 13 printing control hooks 44 7 073 W
— the hook 44 7 076 Z
— the hook 44 7 135 R
— the hook 44 7 128 S.

In the appropriate seats of the comb 44 7 671 A insert correctly orientated the reinforcing rod 44 7 134 Q.

c) Secure the hooks and the small rod by means of the shaft 44 7 102 Z.

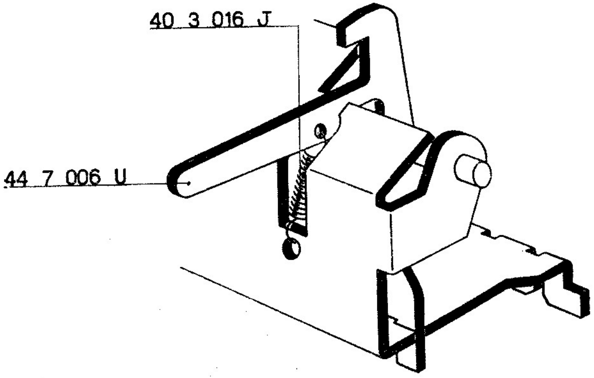
d) Hook the springs 40 3 016 J to the appropriate holes of the support 44 7 071 U.

44 7 006 U	Date printing hook
44 7 073 W	Printing control hook
44 7 076 Z	Special signs printing control hook
44 7 102 Z	Shaft of the sliders and hooks guide comb
44 7 128 S	Hook
44 7 134 Q	Reinforcing rod
44 7 135 R	Second register special rigns printing control hook
44 7 671 A	Printing sliders and hooks guide comb
40 3 016 J	Spring for 44 7 006 U - 44 7 073 W - 44 7 076 Z - 44 7 125 R and 44 7 128 S


44 7 135 R
44 7 128 S
44 7 006 U
44 7 073 W
44 7 076 Z
44 7 671 A
44 7 102 Z
40 3 016 J
44 7 134 Q
40 3 016 J

328

329


40 3 016 J
44 7 006 U

243 - FIGURES 330 - 331 - 332

Assembling the printing selection unit.

a) Remove the shaft 44 7 102 Z from the printing selection unit prepared in the precedent paragraph.

b) Depress total key and move the control plate rearward. Rotate the main shaft preventing in the same time the interested register to engage with the racks. The racks will therefore move up to position « 9 ».

c) Remove the two spring-clips 945 3 41 A which secure the shaft 52 1 091 B. Take off the shaft.

d) Assemble the printing selection unit prepared in the precedent paragraph. The selection hooks should take the position illustrated in the figure 330 with respect to the plate 44 7 378 W. The same hooks should take, with respect to the main racks, the position illustrated in the figure 331. The date printing hook should take the position illustrated in the figure 332 with respect to the plate 44 7 387 W.

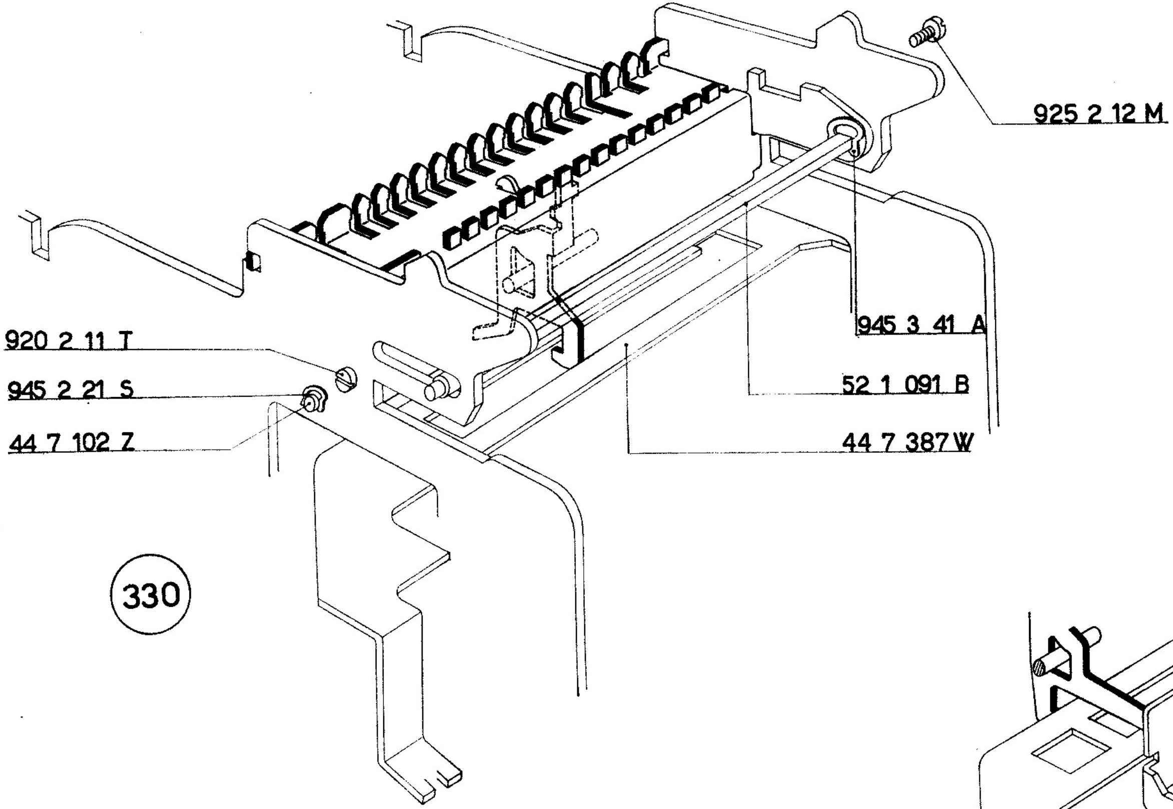
e) Secure the printing selection unit support by means of the screws 920 2 11 T and 925 2 12 M.

f) Insert in the appropriate guide holes of the two internal side-plates of the machine the shaft 44 7 102 Z; selure it by means of two spring-clips 945 2 21 S.

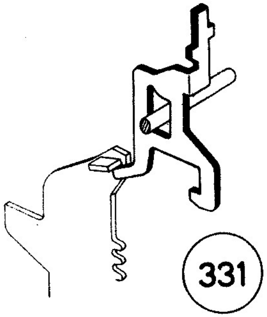
g) Assemble again the shaft 52 1 091 B and secure it with its two spring-clips 945 3 41 A.

h) Move the main shaft to rest.

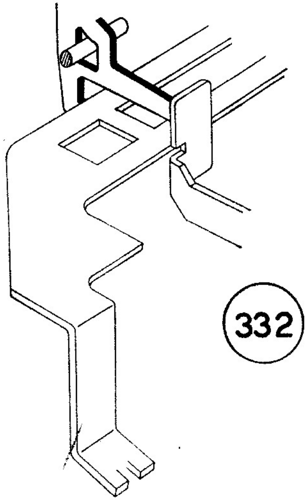
44 7 102 Z	Shaft of the sliders and hooks guide comb
44 7 387 W	Printing control plate
52 1 091 B	Securing screw for the printing selection unit
925 2 12 M	Securing screw for the printing selection unit
945 2 21 S	Spring-clip for 44 7 102 Z
945 3 41 A	Spring-clip for 52 1 091 B


925 2 12 M
920 2 11 T
945 3 41 A
945 2 21 S
52 1 091 B
44 7 102 Z
44 7 387 W

330



331



332

244 - FIGURE 333

Assembling the ribbon reverse rocker and the ribbon advance and stabilizing pawls.

a) On the side-plates connection shaft 44 1 008 G assemble the ribbon reverse rocker 44 7 023 L securing it by means of a spring-clip 945 2 21 S.

b) Place this unit between the two internal side-plates of the machine as illustrated in the figure. Secure the shaft 44 1 008 G by means of the two columns 43 1 016 D.

c) On the left column 43 1 016 D place the ribbon reverse rocker 44 7 024 M securing it with a spring-clip 945 2 51 G.

Between the rocker and the spring-holder 44 7 063 U, hook the spring 42 2 042 N.

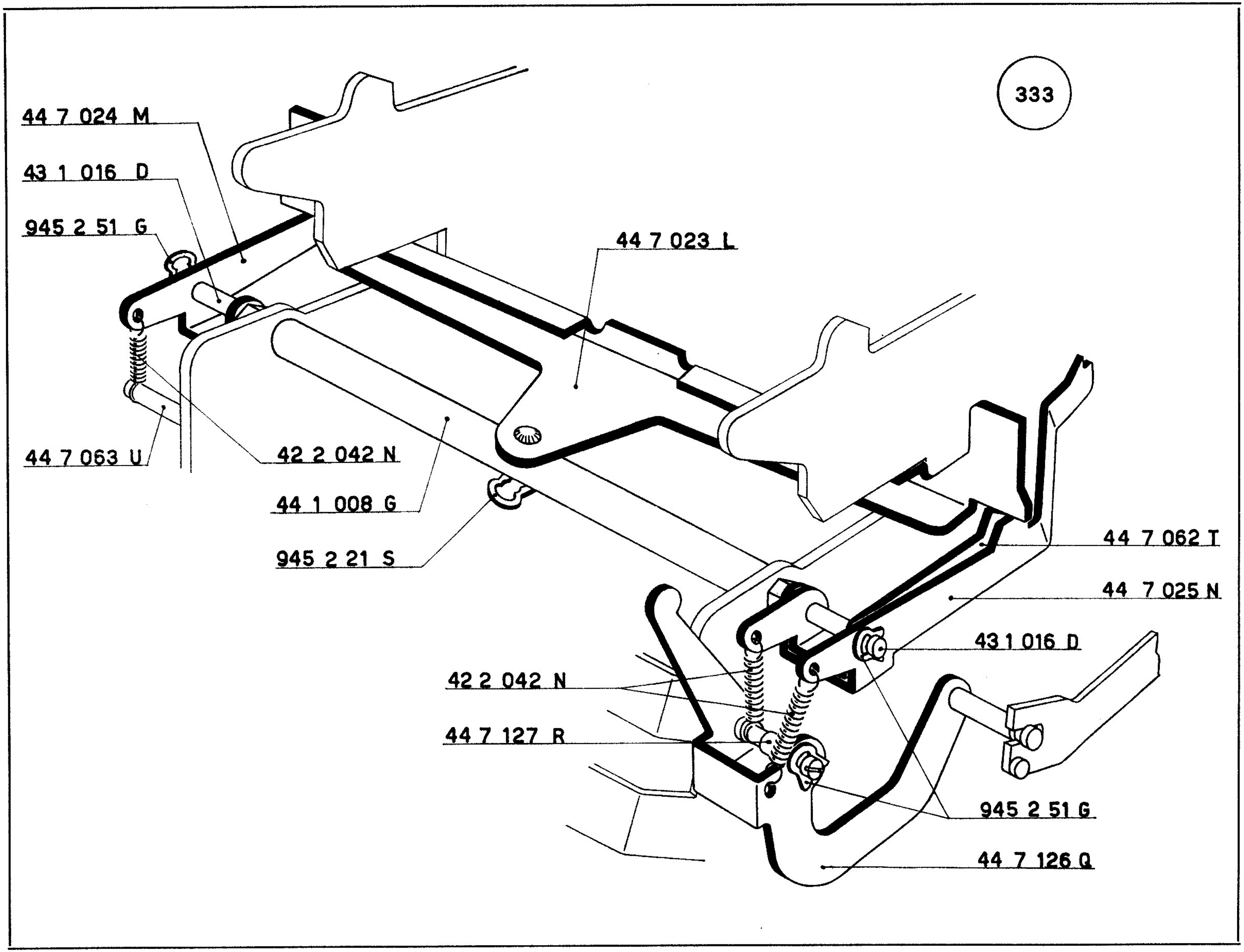
d) On the right column 43 1 016 D place the ribbon reverse rocker 44 7 025 N and the rocker stabilizer 44 7 062 T securing them with a spring-clip 945 2 51 G.

e) Unscrew the column 44 7 127 R and place the printing release bridge 44 7 126 Q on it. Fit again the column and secure the bridge by means of a spring-clip 945 2 51 G.

f) Between the stabilizer 44 7 062 T and the column 44 7 127 R, hook the spring 42 2 042 N.

g) Between the rocker 44 7 025 N and the bridge 44 7 126 Q, hook the spring 42 2 042 N.

44 1 008 G	Side-plates connection shaft
44 7 023 L	Ribbon reverse rocker
44 7 024 M	Ribbon advance and stabilizing left pawl
44 7 025 N	Ribbon advance and stabilizing right pawl
44 7 062 T	Ribbon reverse rocker stabilizer
44 7 063 U	Special spring-holder
44 7 126 Q	Printing release bridge
44 7 127 R	Special column
42 2 042 N	Spring for 44 7 062 T, 44 7 024 M and 44 7 025 N
43 1 016 D	Column for ribbon advance pawls
945 2 21 S	Spring-clip
945 2 51 G	Spring-clip
945 3 41 A	Spring-clip


333
44 7 024 M
43 1 016 D
945 2 51 G
44 7 023 L
44 7 063 U
42 2 042 N
44 1 008 G
945 2 21 S
44 7 062 T
44 7 025 N
43 1 016 D
42 2 042 N
44 7 127 R
945 2 51 G
44 7 126 Q

245 - FIGURE 334

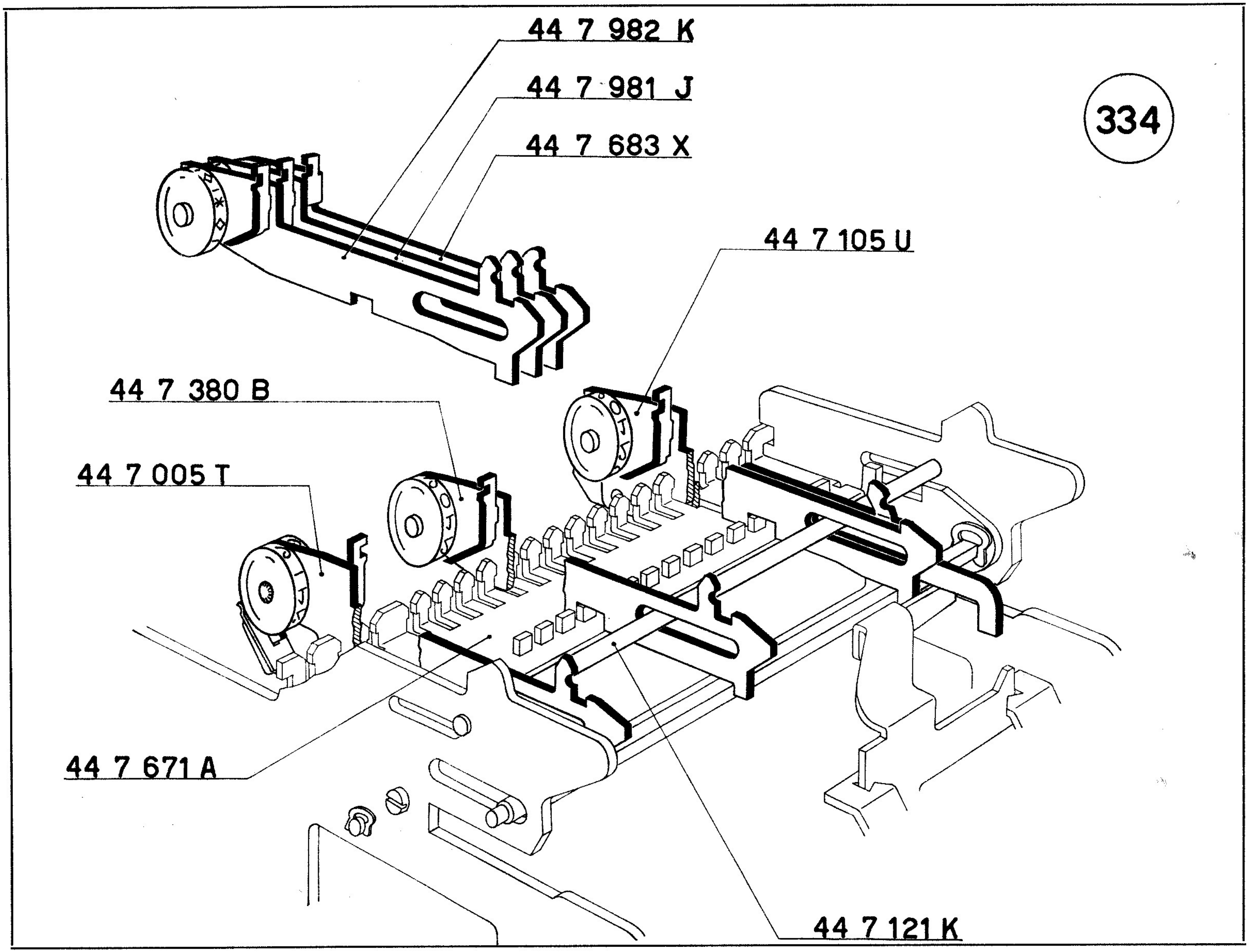
Assembling the printing sliders.

a) In the appropriate guide slots o the comb 44 7 671 A place the printing sliders. The assembly order from left to right is the followin (remembering that the first slot should remain empty):

— 2 date printing sliders 44 7 005 T
— 12 numeral printing sliders 44 7 080 S
— 1 numeral printing slider with sign C for credit balance 44 7 105 U
— 1 first register special signs printing slider 44 7 682 W
— 1 second register special signs printing slider 44 7 681 V
— 1 printing slider for sign X 44 7 683 X.

b) The sliders should be secured by means of the appropriate small shaft 44 7 121 K.

44 7 005 T	Date printing slider
44 7 080 S	Numeral printing slider
44 7 105 U	Numeral printing slider with sign C for credit balance
44 7 121 K	Printing sliders guide shaft
44 7 671 A	Printing sliders and hooks guide comb
44 7 681 V	Second register special signs printing slider
44 7 682 W	First register special signs printing slider
44 7 683 X	Printing slider with sign X


44 7 982 K
44 7 981 J
44 7 683 X
334
44 7 105 U
44 7 380 B
44 7 005 T
44 7 671 A
44 7 121 K

246 - FIGURE 335

Preparing the sliders guide comb.

a) On the sliders guide comb 44 7 672 B hook the slider springs where shown by the arrows.

b) The springs 68 0 342 C are used for the date sliders.

c) The spring 40 8 052 B is used for the numeral slider with sign C for credit balance.

d) The springs 68 0 320 L are used for all the other numeral - special signs - sign X sliders.

44 7 121 K	Printing slider guide shaft
44 7 672 B	Sliders guide comb
40 8 052 B	Spring for numeral printing slider with sign C for credit balance

247 - FIGURE 336

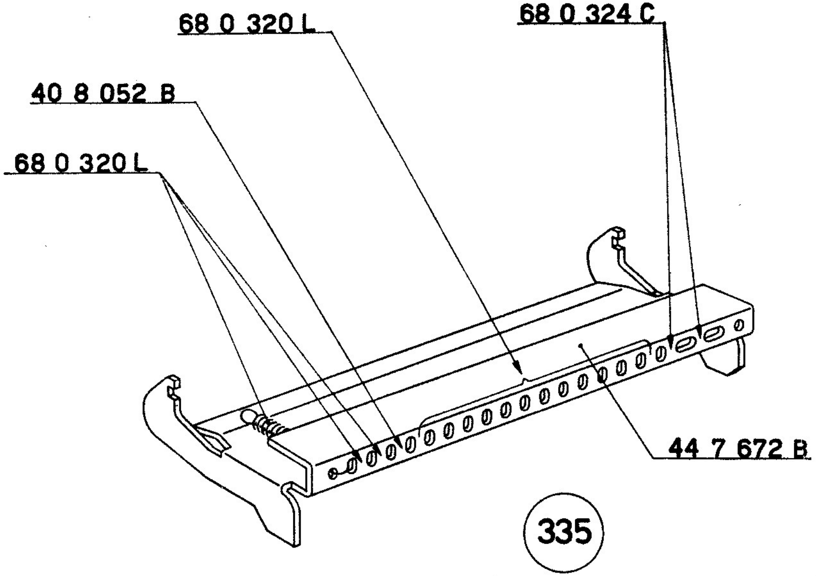
Assembling the sliders guide comb.

a) Assemble the sliders guide comb 44 7 672 B prepared in the precedent paragraph. In its guide slots insert the printing sliders. The comb should also secure the shaft 44 7 121 K.

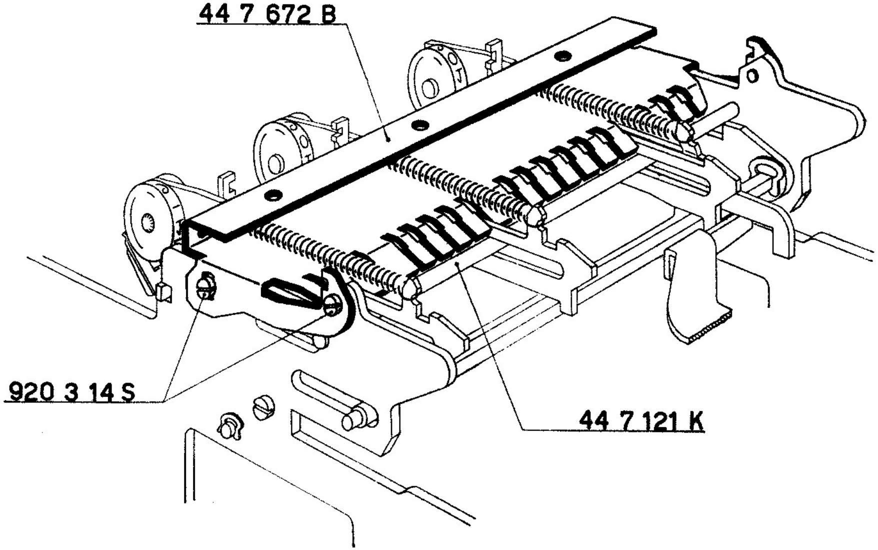
b) Secure the comb to the two internal side-plates of the machine by means of four screws 920 3 14 S which must not be tightened right home. Temporarily, the rear screws must be placed in the middle of their proper slot.

c) Hook the springs to the proper printing sliders.

68 0 320 L	Spring for numeral - special signs - sign X sliders
68 0 324 C	Spring for date sliders
920 3 14 S	Securing screw for 44 7 672 B


68 0 320 L
68 0 324 C
40 8 052 B
68 0 320 L
44 7 672 B

335


44 7 672 B
920 3 14 S
44 7 121 K

336

248 - FIGURE 337

Assembling the sliders guide upper comb.

a) Depress a total key and move the control plate rearward.

b) Prevent the engagement of the register and rotate the main shaft until the printing sliders trip rearward.

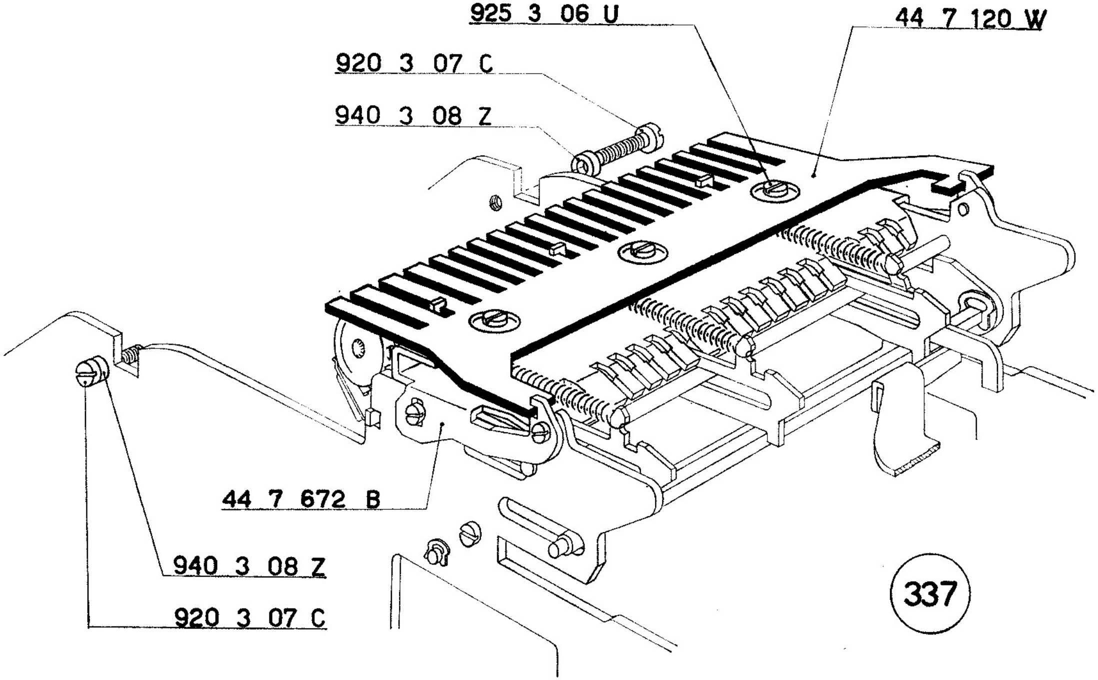
c) In these conditions assemble the sliders guide upper comb 44 7 120 W; in its guide slots insert the lugs of the sliders.

Complete the cycle and insert the comb 44 7 120 W in the two appropriate seats of the comb 44 7 672 B.

d) Secure the comb 44 7 120 W by means of three screws 925 3 06 U. *Move suitably the comb* 44 7 120 W *so that the sliders slide freely*. Tighten the three screws 925 3 06 U.

e) Screw on the two internal side-plates of the machine a screw 920 3 07 C with the proper washer 940 3 08 Z. These screws should limit the vertical travel of the rear plate (figure 370).

44 7 120 W	Sliders guide upper comb
44 7 672 B	Sliders guide comb
925 3 06 U	Securing screw for 44 7 120 W

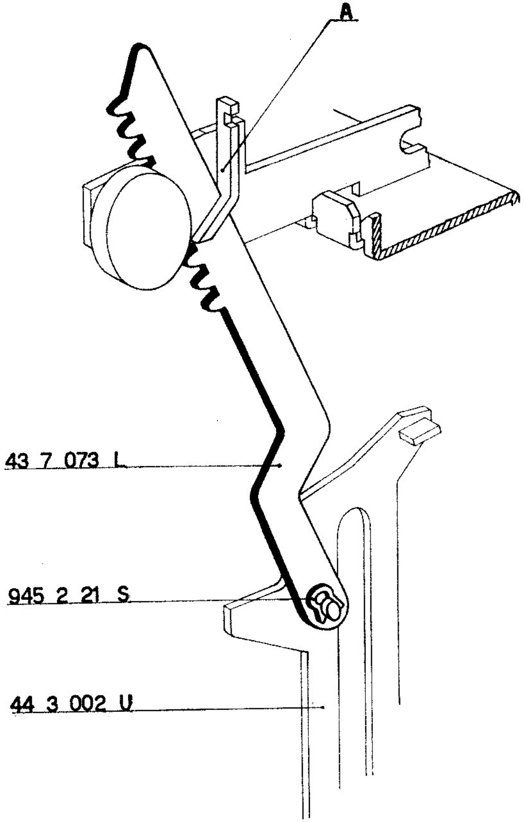

925 3 06 U
44 7 120 W
920 3 07 C
940 3 08 Z
44 7 672 B
940 3 08 Z
920 3 07 C
337

249 - FIGURES 338 - 339 - 340 - 341

Assembling the small printing racks.

a) The printing sliders should be connected to the proper racks by means of the small printing racks 437073L as illustrated in the figure 338. *The wheels of the printing sliders should be suitably adjusted with respect to the proper racks* (see next page).

44 3 002 U	Rack
43 7 073 L	Small printing rack
945 2 21 S	Spring-clip


A
43 7 073 L
945 2 21 S
44 3 002 U

338

To assemble the small printing racks 43 7 073 L follow these instructions:

b) Move the transfer lever to rest. Depress the total key of the second register and move the control plate rearward.

c) Prevent the engagement of the register and rotate the main shaft until all the racks reach the position « 9 » and the sliders the printing position.

d) Assemble the small racks 43 7 073 L starting from the first left rack. Carry on like this:

— place the numeral wheel to « 0 » (see figure 339); place the small rack 43 7 073 L on it. Lower this small rack and connect it to the proper main rack. Secure with a spring clip 945 2 21 S.

Move the main rack to « 0 » and assemble the next small rack 43 7 073 L of the following slider.

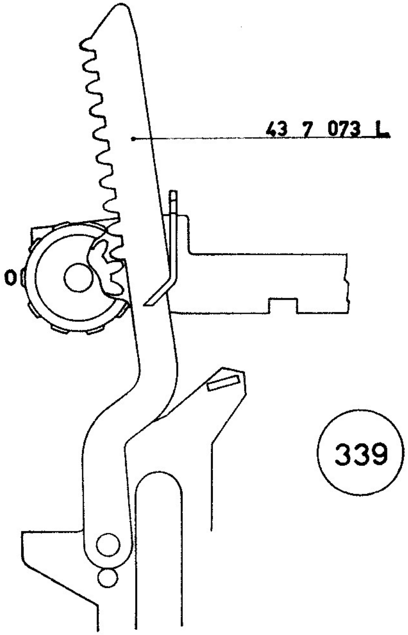
e) The small rack 43 7 073 L of the first register special signs slider should be inserted when the proper wheel is in the position illustrated in the figure 340.

f) The small rack 43 7 073 L of the second register special signs slider should be inserted when the proper wheel is in the position illustrated in the figure 341.

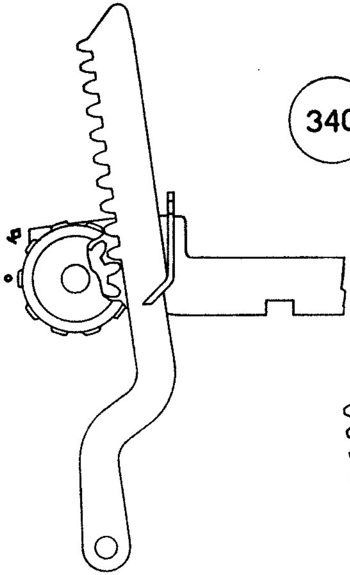
g) Move the main shaft back to rest and check that the printed line reads:

0000000000000o =

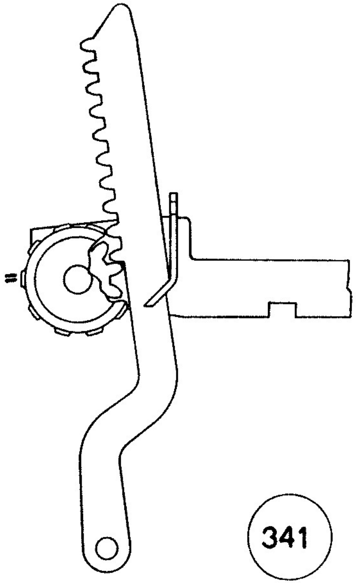
43 7 073 L	Small printing rack



339



340



341

250 - FIGURE 342

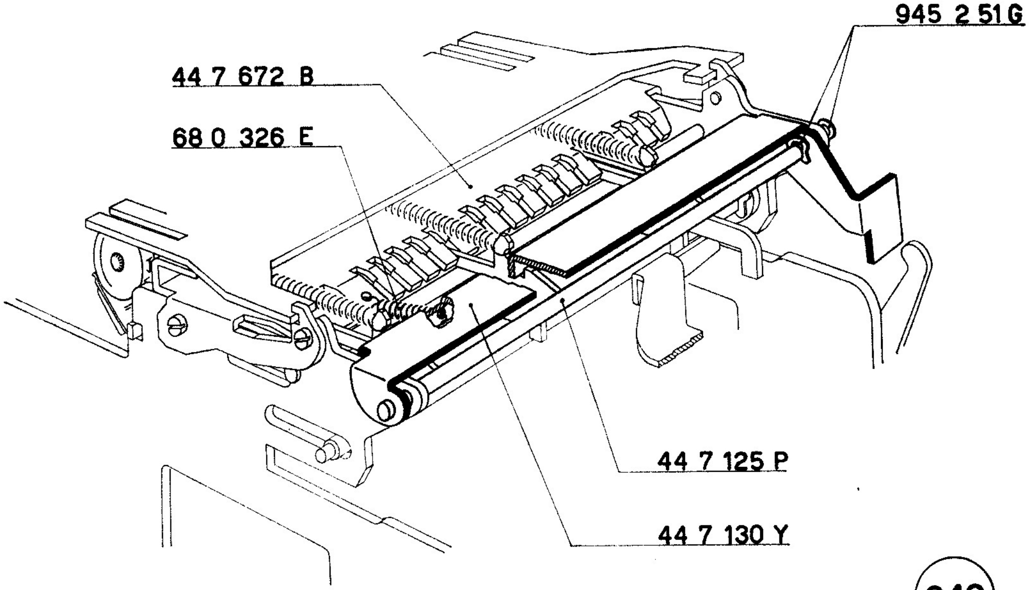
Assembling the printing sliders control bridge.

a) Assemble as illustrated in the figure the printing sliders control bridge 44 7 130 Y. Secure it with the shaft 44 7 125 P.

b) Secure the bridge and the shaft with two spring-clips 945 2 51 G.

c) Between the bridge 44 7 130 Y and the comb 44 7 672 D, hook the spring 68 0 326 E.

44 7 125 P	Shaft of the printing sliders control bridge
44 7 130 Y	Printing sliders control bridge
44 7 672 B	Sliders guide comb
68 0 326 E	Spring for 44 7 130 Y
945 2 51 G	Spring-clip


945 2 51 G
44 7 672 B
68 0 326 E
44 7 125 P
44 7 130 Y

342

251 - FIGURE 343

Preparing the ribbon holding unit.

a) Assemble on the right spool support plate 44 7 320 E:

— the ribbon advance toothed wheel 43 7 026 D and the spools clutch leaf-spring 43 7 035 E with the proper shaft 43 7 032 B. The extension **A** of the wheel should be inserted in the slot **F** of the leaf-spring. Secure the shaft 43 7 032 B by means of the nut 928 3 05 G

— the arm 43 7 328 Y by means of the special pivot 43 7 334 N and nut 43 7 636 M

— the ribbon holding wing 43 7 031 A by means of the pivot 43 7 329 Z. Between the wing and the plate 44 7 320 E place the washer 940 3 62 N.

b) Between the hook **G** of the arm 43 7 328 Y and the top **P** of the pivot 43 7 329 Z, hook the spring 40 5 121 J.

c) On the left spool support plate 44 7 319 H assemble:

— the ribbon advance toothed wheel 43 7 026 D and the spools clutch leaf-spring 43 7 035 E with the proper shaft 43 7 032 B. The extension of the wheel should be inserted in the slot of the leaf-spring.

Secure the shaft 43 7 032 B by means of the nut 938 3 05 G

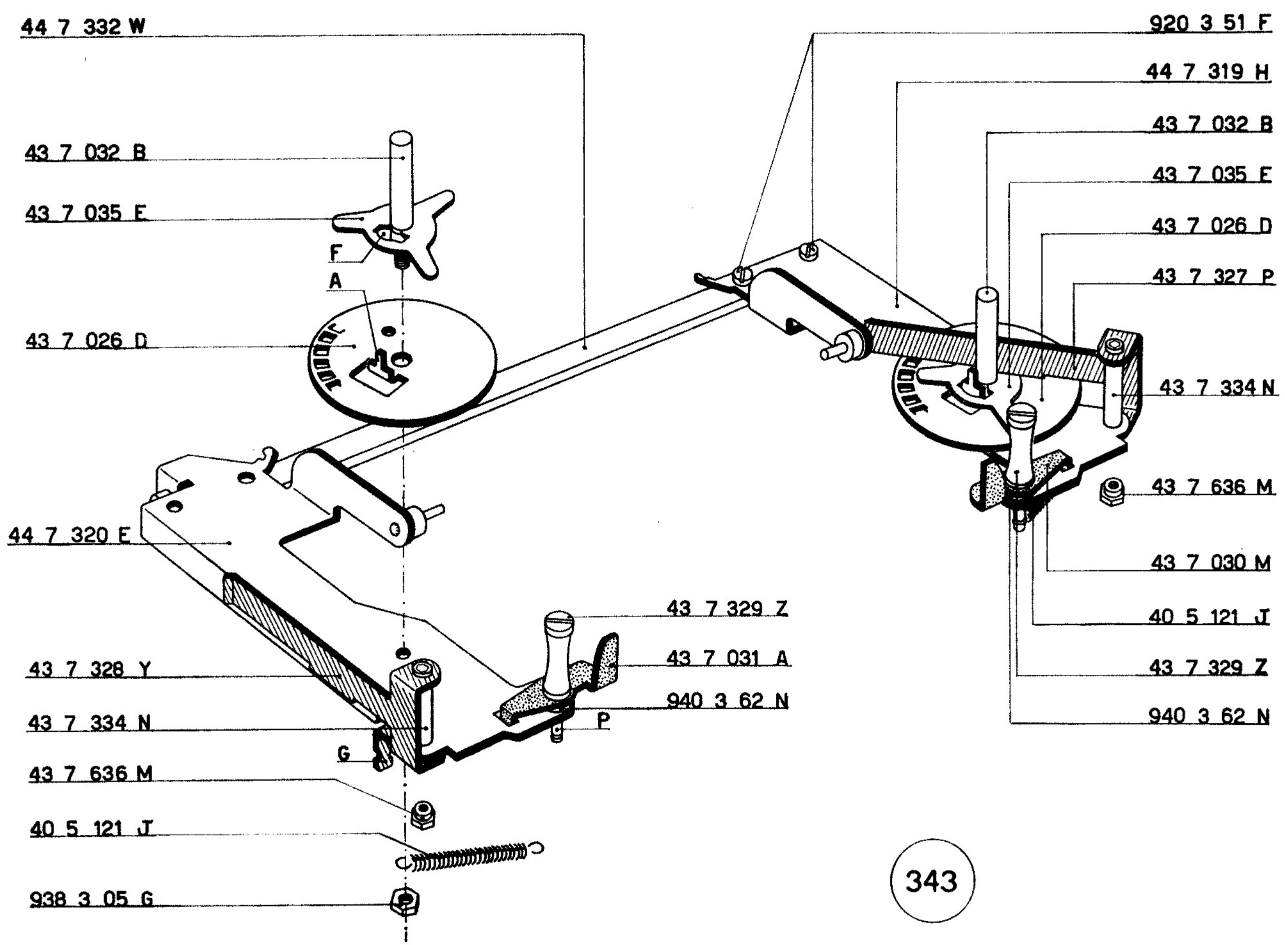
— the arm 43 7 327 P by means of the special pivot 43 7 334 N and nut 43 7 636 M

— the ribbon holding wing 43 7 030 M by means of the pivot 43 7 329 Z. Between the wing and the plate 44 7 319 H place the washer 940 3 62 N.

d) Hook the spring 40 5 121 J between the arm hook 43 7 327 P and the top of the pivot 43 7 329 Z.

e) Secure the plate 44 7 319 H now prepared to the small bar 44 7 332 W by means of two screws 920 3 51 F which must not be tightened right home.

44 7 319 H	Left spool support plate
44 7 320 E	Right spool support plate
44 7 332 W	Spools support plate connection bar
40 5 121 J	Spring for 43 7 327 P and 43 7 328 Y
43 7 026 D	Ribbon advance toothed wheel
43 7 030 M	Left ribbon holding wing
43 7 031 A	Right ribbon holding wing
43 7 032 B	Column for wheel 43 7 026 D
43 7 035 E	Spool clutch leaf-spring
43 7 327 P	Left arm
43 7 328 Y	Right arm
43 7 329 Z	Ribbon guide pivot
43 7 334 N	Special pivot for 43 7 327 P and 43 7 328 Y
43 7 636 M	Special guide nut for arm
920 3 51 F	Securing screw for 44 7 319 H
938 3 05 G	Nut for 43 7 322 W
940 3 62 N	Washer


44 7 332 W
43 7 032 B
43 7 035 E
F
A
43 7 026 D
44 7 320 E
43 7 328 Y
43 7 334 N
G
43 7 636 M
40 5 121 J
938 3 05 G
43 7 329 Z
43 7 031 A
940 3 62 N
P
920 3 51 F
44 7 319 H
43 7 032 B
43 7 035 E
43 7 026 D
43 7 327 P
43 7 334 N
43 7 636 M
43 7 030 M
40 5 121 J
43 7 329 Z
940 3 62 N
343

252 - FIGURES 344 and 345

Assembling the ribbon holding unit.

a) Assemble on the machine the ribbon holding unit prepared in the precedent paragraph.

The pivots **P** should be inserted in the appropriate chamfers of the two sliders restoring connecting-rod 44 7 684 Y (figure 345) and 44 7 685 Z.

b) By means of the two screws 920 3 51 F secure the plate 44 7 320 E to the small bar 44 7 332 W.

c) Adjust suitably the position of the two plates 44 7 319 H *and* 44 7 320 E *to reduce the axial play of the unit to the minimum. Tighten the four screws* 920 3 51 F.

d) Hook the springs 68 0 406 G between the plates 44 7 319 H - 44 7 320 E and the end of small bar 52 1 091 B.

e) Hook the spring 40 8 152 C between the plate 44 7 320 E and the lever 44 7 129 T.

253 - FIGURE 344

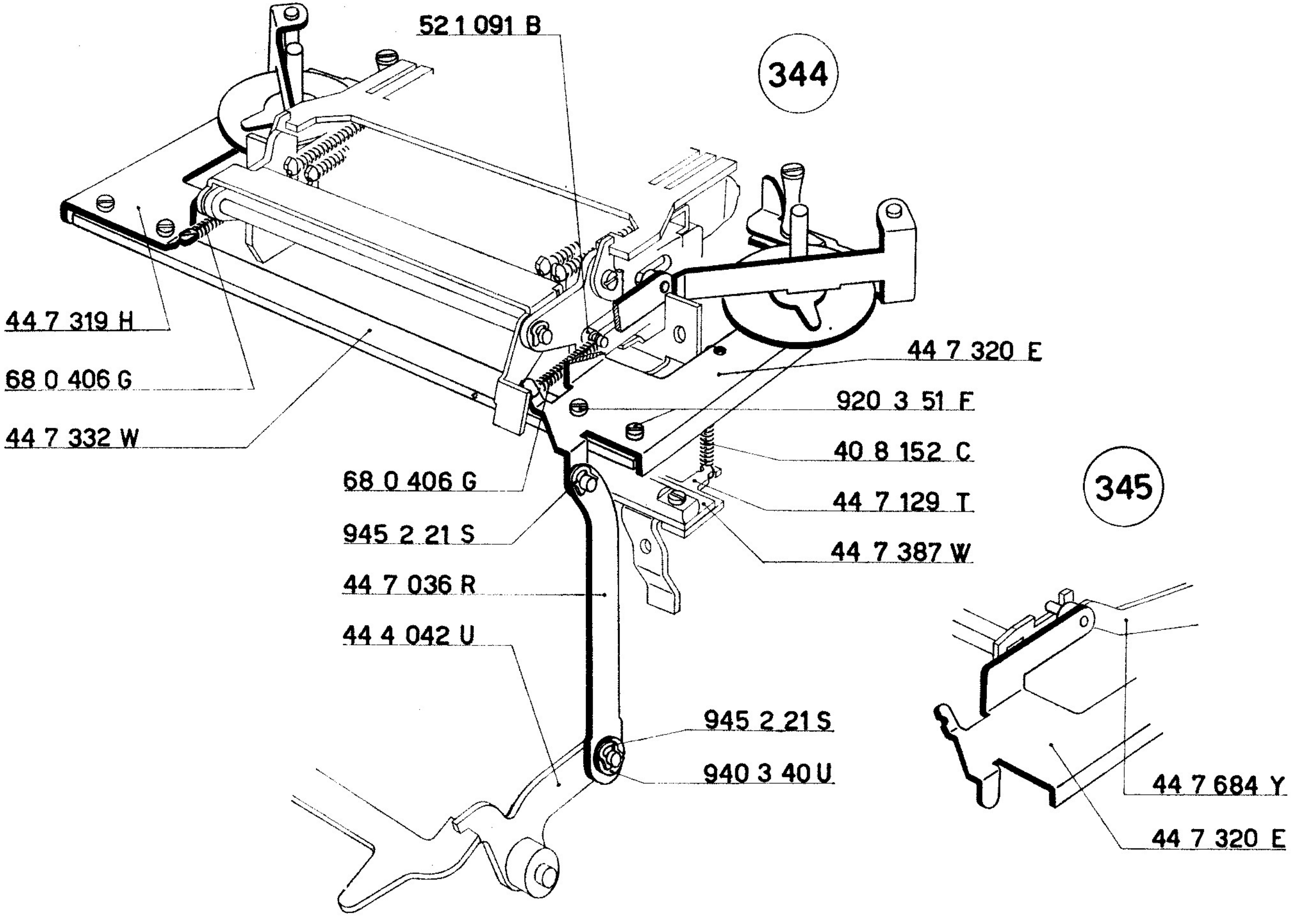
Assembling the bicolour control rod.

Connect the plate 44 7 320 E to the crank 44 4 042 U by means of the bicolour control rod 44 7 036 R. Secure the rod:

— up: by means of a spring-clip 945 2 21 S

— down: by means of a spring-clip 945 2 21 S interposing the washer 940 3 40 U.

44 4 042 U	Non-print and repeat crank
44 7 036 R	Bicolour control rod
44 7 129 T	Printing plate release control lever
44 7 319 H	Left spool supporting plate
44 7 320 E	Right spool supporting plate
44 7 332 W	Spools supporting plate connection bar
44 7 387 W	Printing control plate
44 7 684 Y	Type-sliders restoring left plate
40 8 152 C	Spring for 44 7 129 T - 44 7 320 E
52 1 091 B	Printing sliders restoring bar
68 0 406 G	Spring for 44 7 319 H and 44 7 320 E
920 3 51 F	Cheese-head spring for 44 7 320 E
940 3 40 U	Washer
945 2 21 S	Spring-clip


344
52 1 091 B
44 7 319 H
68 0 406 G
44 7 332 W
68 0 406 G
945 2 21 S
44 7 036 R
44 4 042 U
945 2 21 S
940 3 40 U
44 7 320 E
920 3 51 F
40 8 152 C
44 7 129 T
44 7 387 W
345
44 7 684 Y
44 7 320 E

254 - FIGURE 346

Adjusting the printing control lever.

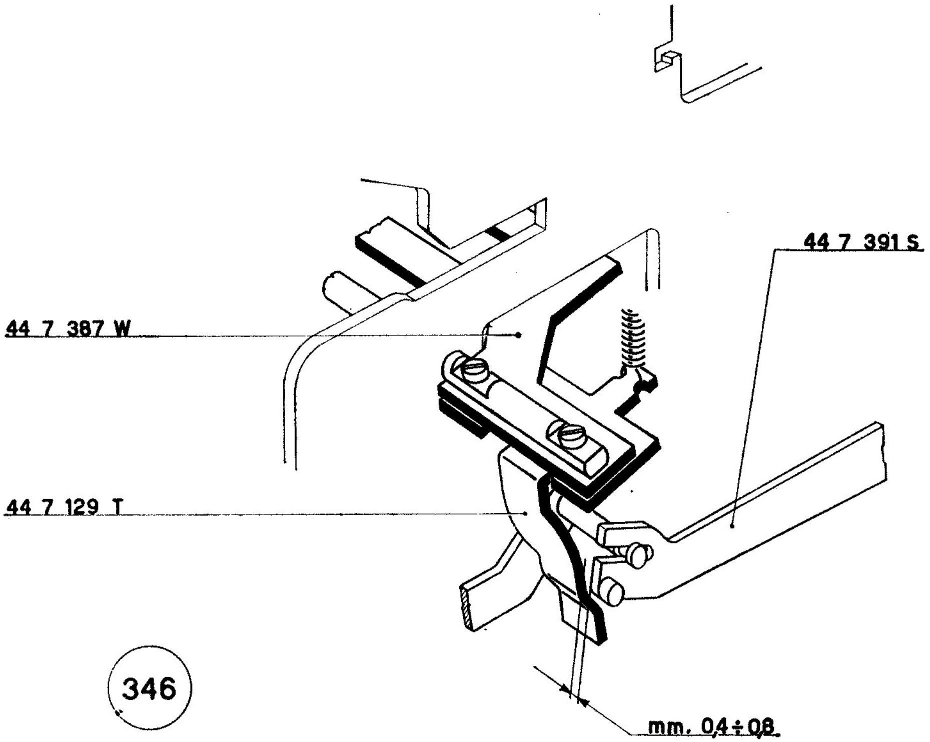
a) Move the main shaft of the machine to rest.

In these conditions the printing control plate 44 7 387 W *rests on the right internal side-plate of the machine.*

b) Rotate by hand the printing control lever 44 7 391 S *and check that it passes with respect to the lever* 44 7 129 T *with a clearance of* 0.4÷0.8 *mm.*

Act if necessary on the same lever 44 7 391 F.

44 7 129 T	Printing plate release control lever
44 7 387 W	Printing control plate
44 7 391 S	Printing control lever


44 7 391 S
44 7 387 W
44 7 129 T
mm. 0,4÷0,8

346

255 - FIGURES 347 and 348

Adjusting the printing control plate transmission lever.

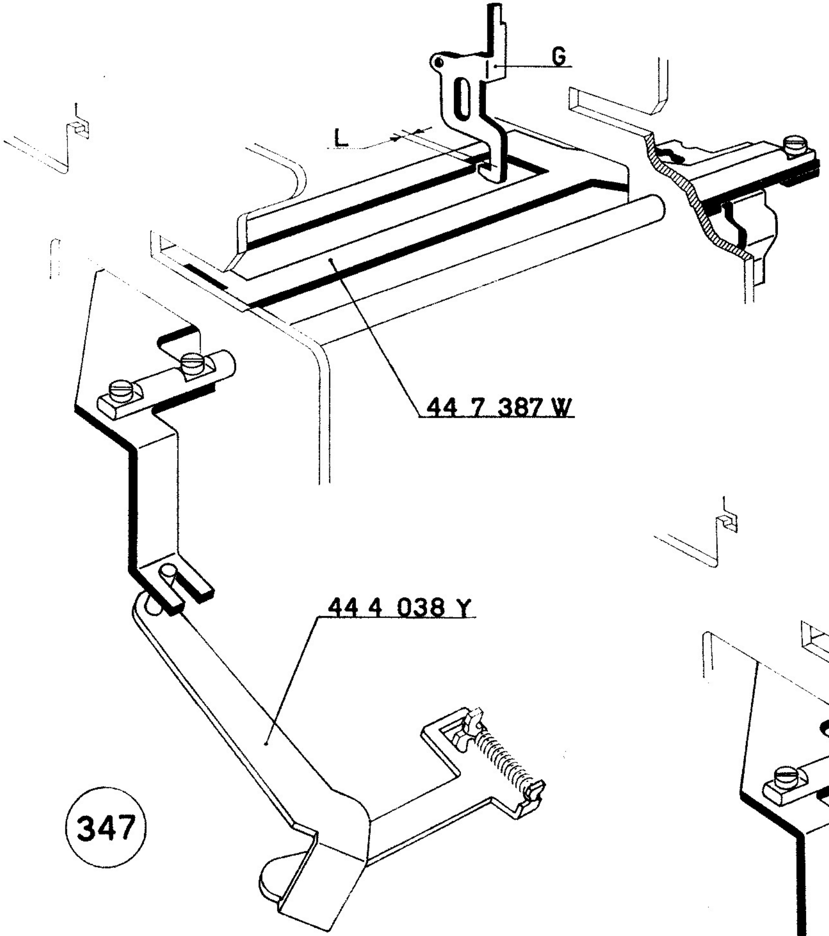
a) Make a correction cycle and check that the printing control plate 44 7 387 W *remains at rest and doesn't move.*

b) Make an adding cycle and check that the movement of the plate 44 7 387 W *allows obtaining the clearance* **L** *shown in the figure* 347. *The hook* **G** *controls in the fact the slider with the sign* X *which should not print during an adding cycle.*

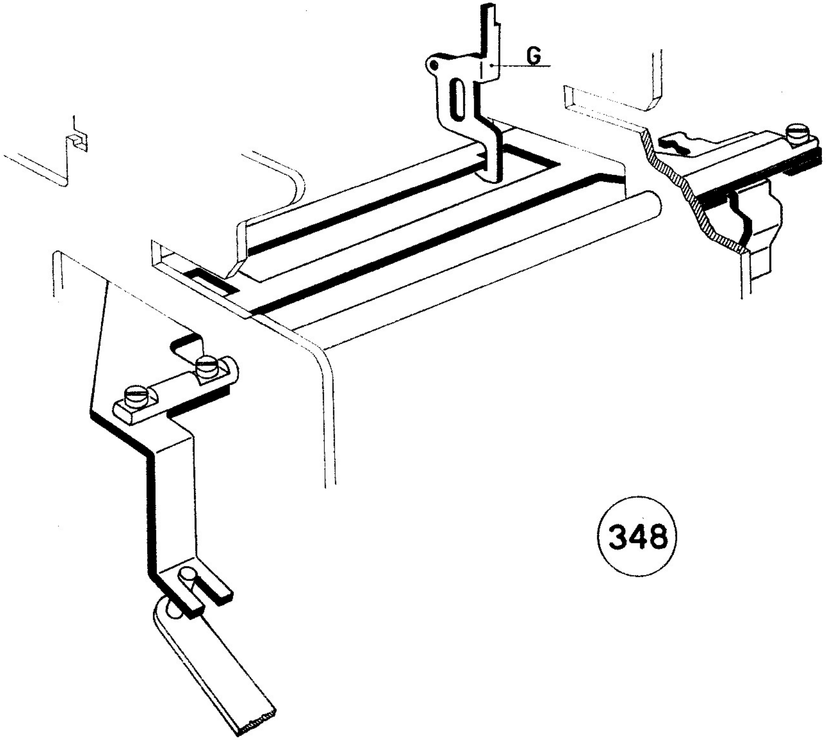
c) Make a « memory input » cycle. The plate 44 7 387 W *should move in such a way to control the hook* **G** *(figure* 348).

d) The three above conditions are obtained by acting suitably on the transmission lever 44 4 038 Y.

44 4 038 Y	Printing control plate transmission lever
44 7 387 W	Printing control plate


G
L
44 7 387 W
44 4 038 Y

347



348

256 - FIGURE 349

Preparing the paper-feed plate.

a) In the appropriate guide holes of the paper-feed plate 43 7 051 N place the shafts of the front and rear paper-feed rollers 43 7 054 R and 43 7 055 J.

b) *The axial play of the shafts must be minimum and their rotation perfect.*

257 - FIGURE 350

Preparing the tape-roll holding arms.

a) On the two shafts 44 7 055 U place as illustrated in the figure:

— the left tape-roll holding arm 43 7 059 W
— the paper release bridge 44 7 052 Z
— the right tape-roll holding arm 43 7 060 T.

b) Hook the spring 40 7 203 F to the bridge 44 7 052 Z.

258 - FIGURE 351

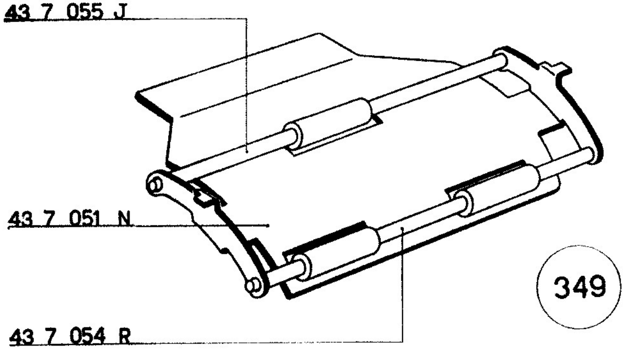
Preparing the line-space control lever and line-space wheel stabilizing bridge.

a) On the shorter threaded end of the support 43 7 062 R place correctly orientated the line-space control lever 44 7 045 S, the washer 940 3 14 E and the nut 938 3 05 G. This latter must be tightened right home.

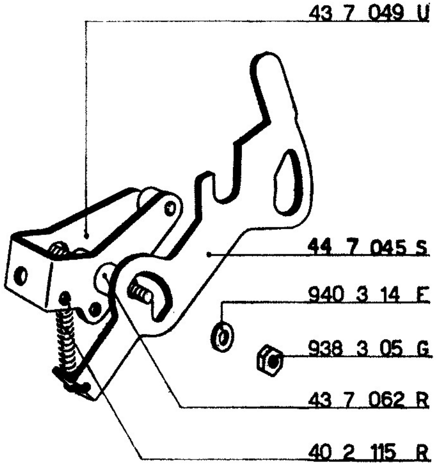
b) On the same support place the line-space wheel stabilizing bridge 43 7 049 U.

c) Between the bridge 43 7 049 U and the lever 43 7 046 R, hook the spring 40 2 115 R.

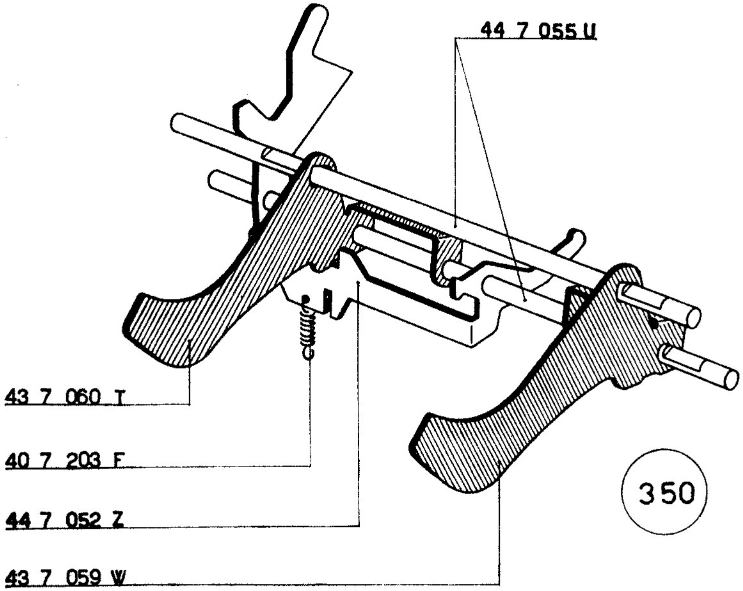
44 7 045 S	Line-space control lever
44 7 052 Z	Paper release bridge
44 7 055 U	Spacing thaft
40 2 115 R	Spring for 43 7 049 U - 44 7 045 S
40 7 203 F	Spring for 44 7 052 Z
43 7 049 U	Line-space wheel stabilizing bridge
43 7 051 N	Paper-feed plate
43 7 054 R	Front paper-feed roller
43 7 055 J	Rear paper-feed roller
43 7 059 W	Left tape-roll holding arm
43 7 060 T	Right tape-roll holding arm
43 7 062 R	Line-space wheel stabilizing support
930 3 05 G	Nut for 43 7 062 R
940 3 14 E	Washer


43 7 055 J
43 7 051 N
43 7 054 R

349


43 7 049 U
44 7 045 S
940 3 14 E
938 3 05 G
43 7 062 R
40 2 115 R

351


44 7 055 U
43 7 060 T
40 7 203 F
44 7 052 Z
43 7 059 W

350

259 - FIGURE 352

Assembling the tape-roll holding arms.

a) Place the tape-roll holding arms unit prepared in the paragraph 257 between the two external side-plates of the machine.

In the guide slot of the paper release bridge 44 7 052 Z insert the profile of the right internal side-plate of the machine.

b) Secure the two shafts 44 7 055 U by means of two screw 920 3 52 G and two stud-screws 926 3 91 J.

c) Hook the spring 68 0 402 C between the two tape-roll holding arms.

d) Hook the spring 40 4 170 E between the right tape-roll holding arm and the paper release bridge 44 7 052 Z.

260 - FIGPRE 352

Assembling the paper-feed plate.

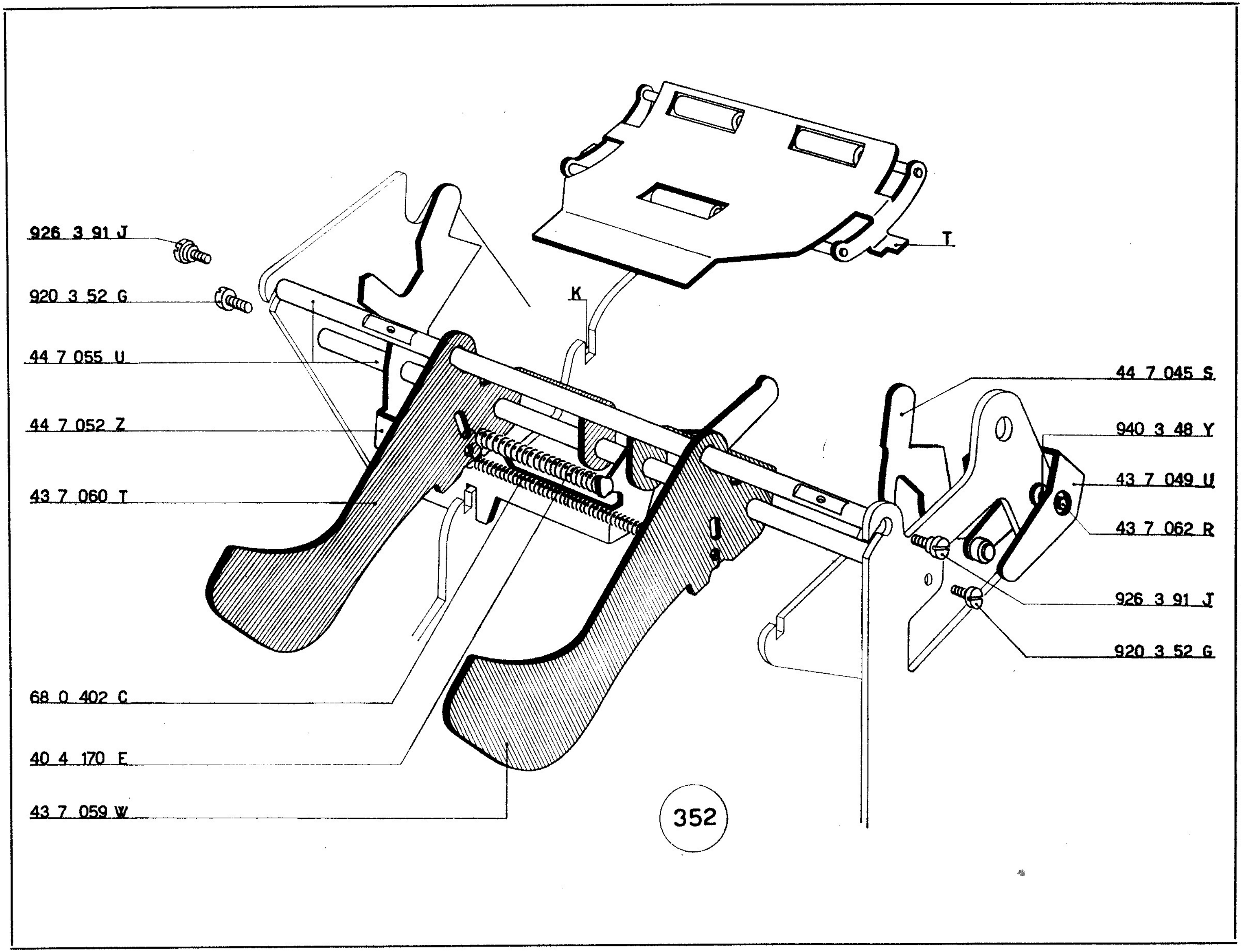
Between the two internal side-plates of the machine locate the paper-feed plate prepared in the paragraph 256. The extensions **T** of the plate must be inserted in the appropriate chamfers **K** made in the internal side-plate of the machine.

261 - FIGURE 352

Assembling the line-space control lever and the line-space wheel stabilizing bridge.

Assemble on the left external side-plate of the machine the unit prepared in the paragraph 258. On the support 43 7 062 R place the washer 940 3 48 Y.

44 7 045 S	Line-space control lever
44 7 052 Z	Paper release bridge
44 7 055 U	Spacing shaft
40 4 170 E	Spring for 43 7 060 T - 44 7 052 Z
43 7 049 U	Line-space wheel stabilizing bridge
43 7 059 W	Left tape-roll holding arm
43 7 060 T	Right tape-roll holding arm
43 7 062 R	Line-space wheel stabilizing support
68 0 402 C	Spring for 43 7 059 W - 43 7 060 T
920 3 52 G	Securing screw 44 7 055 U
926 3 91 J	Securing stud-screw for 44 7 055 U
940 3 48 Y	Washer 43 7 062 R


926 3 91 J
920 3 52 G
44 7 055 U
44 7 052 Z
43 7 060 T
68 0 402 C
40 4 170 E
43 7 059 W
K
T
44 7 045 S
940 3 48 Y
43 7 049 U
43 7 062 R
926 3 91 J
920 3 52 G
352

262 - FIGURE 353

Assembling the line-space stay and its stabilizer.

a) In the appropriate guide slot of the plate 44 4 037 P place the line-space stay 44 7 046 T. Its pivot **P** must be placed in the slot of the line-space control lever 44 7 045 S.

b) Assemble the line-pace stay stabilizer 44 7 048 E as illustrated in the figure.

c) Secure the unit including the lever 44 7 045 S, the bridge 43 7 049 U and the stabilizer 44 7 048 E by means of the nut 44 7 049 F.

d) Hook the spring 40 8 052 B between the stay 44 7 046 T and the support 44 1 014 M.

e) Hook the spring 40 6 092 J between the bridge 43 7 049 U and the left external side-plate of the machine.

44 1 014 M	Casing left support
44 4 037 P	Printing and repeat sliders restoring plate
44 7 045 S	Line-space control lever
44 7 046 T	Line-space stay
44 7 048 E	Line-space stay stabilizer
44 7 049 F	Threaded ring for 43 7 062 R
44 7 052 Z	Paper release bridge
40 6 092 J	Spring for 43 7 049 U
40 7 108 G	Spring

263 - FIGURES 353 and 354

Assembling the platen.

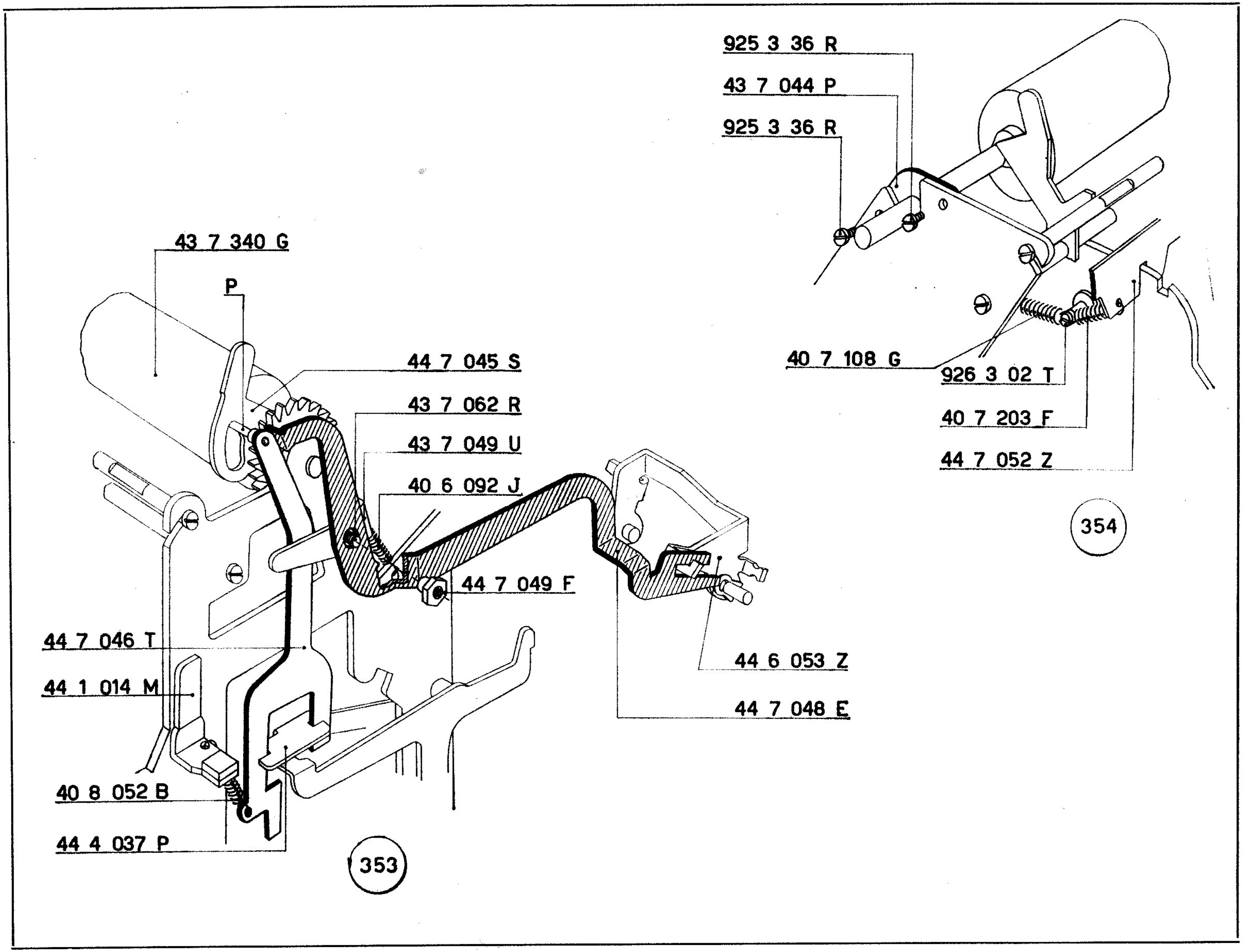
a) Assemble the platen 43 7 340 G which should take the position illustrated in the two figures.

b) Secure the platen by means of the small plate 43 7 044 P which should be secured to the right external side-plate of the machine by means of two screws 925 3 36 R.

c) Unhook the spring 40 7 108 G from the spring-holder 936 3 02 T.

Hook the spring 40 7 203 F of the bridge 44 7 052 Z to the spring-holder 936 3 02 T and then hook again the spring 40 7 108 G.

40 7 203 F	Spring for 44 7 052 Z
40 8 052 B	Spring for 44 7 046 T
43 7 044 P	Platen stop plate
43 7 049 U	Line-space wheel stabilizing bridge
43 7 062 R	Line-space wheel stabilizing support
43 7 340 G	Complete plate
925 3 36 R	Securing screw for 43 7 044 P
936 3 02 T	Spring-holder


925 3 36 R
43 7 044 P
925 3 36 R
40 7 108 G
926 3 02 T
40 7 203 F
44 7 052 Z
354
43 7 340 G
P
44 7 045 S
43 7 062 R
43 7 049 U
40 6 092 J
44 7 049 F
44 7 046 T
44 1 014 M
40 8 052 B
44 4 037 P
44 6 053 Z
44 7 048 E
353

264 - FIGURES 355 and 356

Adjusting the arms 43 7 327 P - 43 7 328 Y.

We have illustrated in the figures the adjustment of the left arm 43 7 327 P*; the same conditions should be obtained for the right arm* 43 7 328 Y.

a) Move the machine to rest. Place the rocker 44 7 023 L *in the position illustrated in the figure* 355. *Check that the arm* 43 7 327 P *passes with respect to the rocker with a clearance of* 0.1 ÷ 0.2 *mm. Act if necessary on the rocker.*

b) Depress an add key and rotate the main shaft. Move as illustrated in the figure 356 *the rocher* 44 7 023 L. *When the diameter of the ribbon is* 15 *mm. (figure* 356) *all the thickness of the arm should contact the rocker* 44 7 023 L *when the ribbon holding unit returns to rest position. Act if necessary on the arm.*

265 . Adjusting the clutch.

Actuate the motor and try to stop by hand the main shaft. The motor should slow down but not stop.

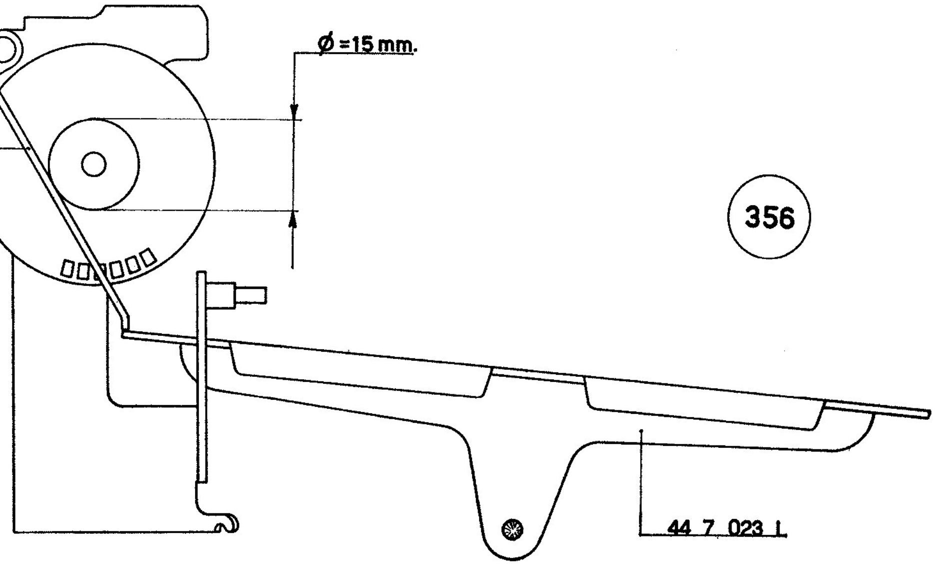
The condition is obtained by increasing or reducing the tension of the leaf-spring 44 4 477 V *by means of the nut* 44 4 479 F *(figure* 37).

266 - Adjusting the motor speed.

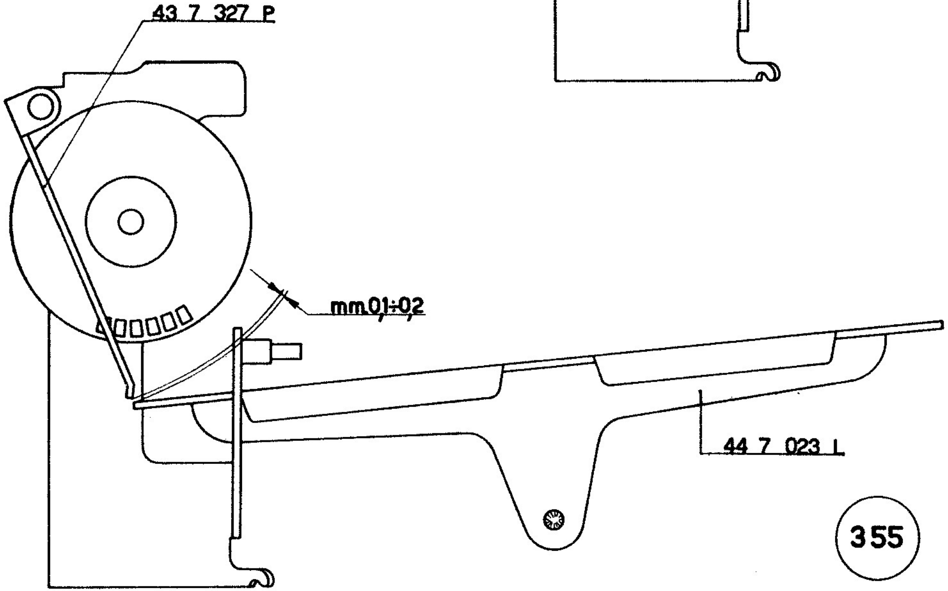
Adjust the speed of the motor so that the machine performs 235 *r.p.m.*

44 7 023 L Ribbon reverse rocker

43 7 327 P Left arm


43 7 327 P
Ø =15 mm.
44 7 023 L

356


43 7 327 P
mm 0,1÷0,2
44 7 023 L

355

267 - FIGURE 357

Adjusting the play of the small racks 43 7 073 L.

a) Make all the racks move up to « 9 » and release the printing sliders so that they move against the plate.

b) In these conditions there must be no play between the small racks 43 7 073 L *and the printing wheels. This is obtained by acting suitably on the wings* **A** *of the sliders by means of the grip* 7135396 H.

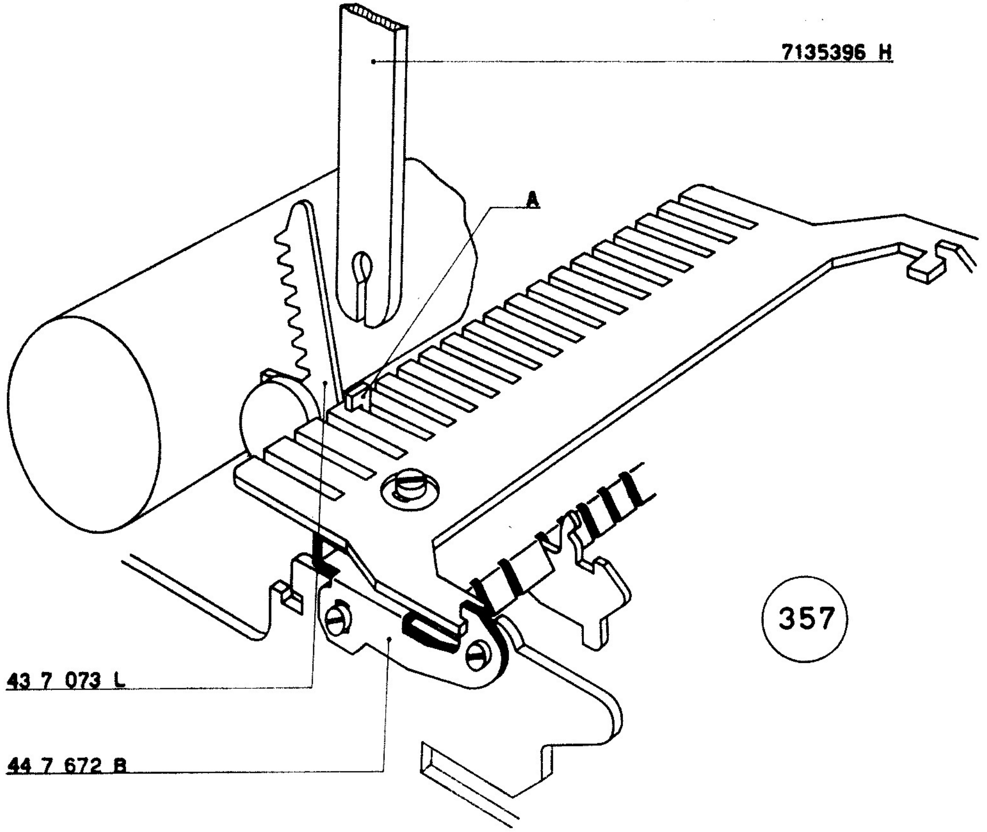
44 7 672 B Sliders guide comb

268 - FIGURE 357

Adjusting the printing of the total on the tape.

Enter twelve figures, add them and then ask the total. The total printed on the tape must be clearly printed up and down. This is obtained by moving the comb 44 7 672 **B** *vertically.*

43 7 073 L Small printing racks


7135396 H
A
43 7 073 L
44 7 672 B
357

269 - FIGURES 358 - 359 - 360

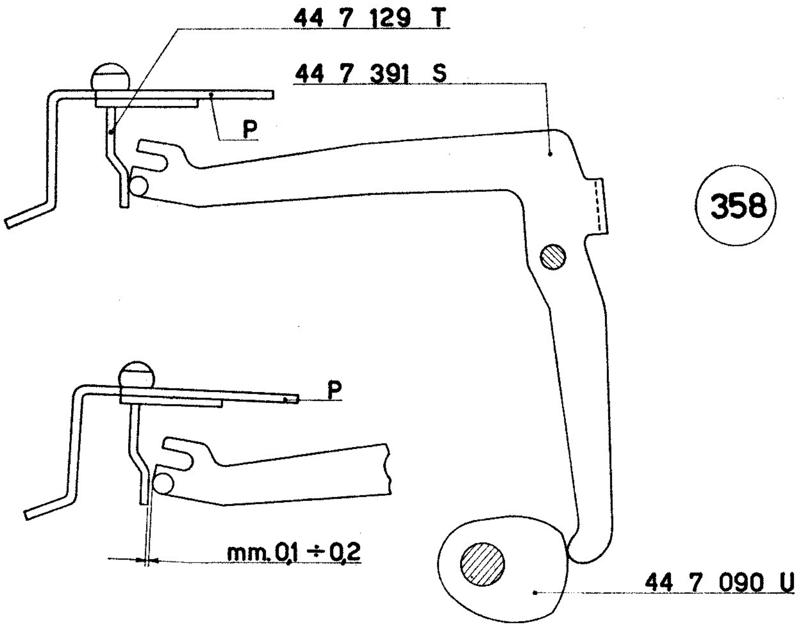
Adjusting the rotation of the printing control plate.

a) Depress an add key and rotate the main shaft until the cam 44 7 090 U *reaches the position illustrated in the figure* 358. *In these conditions rotate by hand the printing control plate* **P** *and check that this second rotation gives the clearance of* 0.1÷0.2 *mm. shown in the figure* 359.

b) Move the main shaft back to rest. We should have the clearance **L** *(minimum value=*0.1 *mm.) shown in the figure* 360.

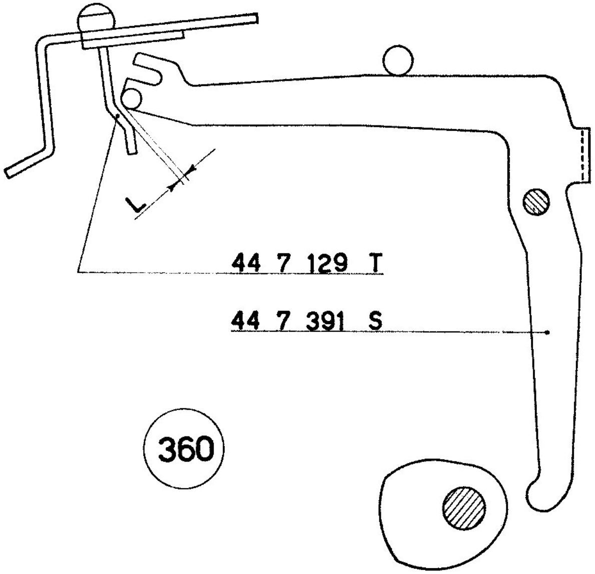
c) The above conditions are obtained by acting suitably on the lever **44 7 129 T.**

44 7 090 U	Printing cam
44 7 129 T	Printing plate release control lever
44 7 391 S	Printing control lever


44 7 129 T
44 7 391 S
P
P
mm. 0,1 ÷ 0,2
44 7 090 U

358

359


L
44 7 129 T
44 7 391 S

360

270 - FIGURE 361

Adjusting the angular position of the printing cam.

a) Enter a series of figures and depress an add key.

b) Rotate by hand the bridge 44 7 130 Y *thus excluding it.*

c) Rotate the main shaft and check that the hook **G** *releases the sliders* **S** *(which will trip in the direction of the arrow toward the platen) when the cam* 44 7 090 U *has made a rotation of* 142°÷145°.

d) The condition is obtained by adjusting the angular position of the cam 44 7 090 U.

44 7 090 U	Printing cam
44 7 126 Q	Printing release bridge
44 7 129 T	Printing plate release control lever

271 - FIGURES 362 and 363

Adjusting the printing sliders control bridge.

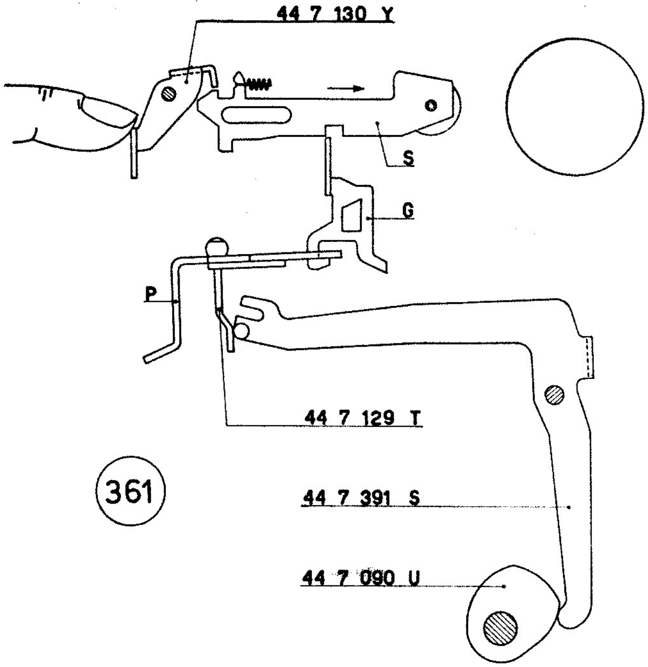
a) Enter a series of figures and depress an add key.

b) Rotate the main shaft and check that the bridge 44 7 130 Y *(figure* 362*) releases the printing sliders* **S** *when the cam* 44 7 090 U *has made a rotation of* 147°÷150°. *The sliders released will be able to trip in the direction of the arrow toward the platen.*

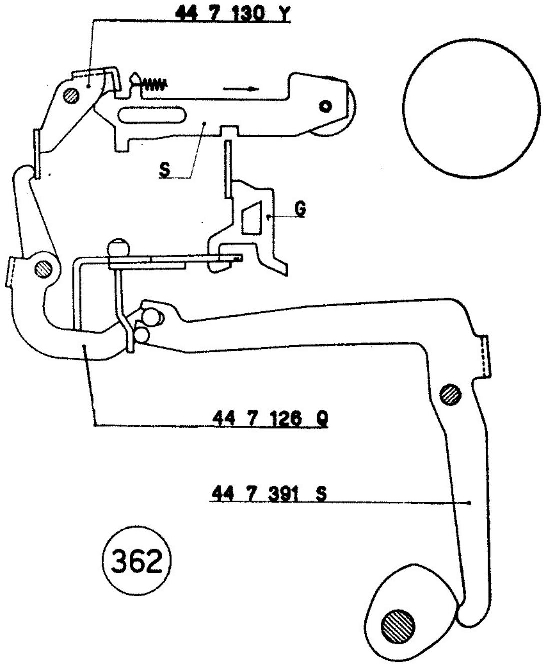
c) Carry on the rotation of the main shaft and check that at maximum restoring there is a clearance of 0.2 *mm. (minimum value) shown in the figure* 363.

d) The above conditions at point b) *and* c) *are obtained by acting suitably on the bridge* 44 7 126 Q.

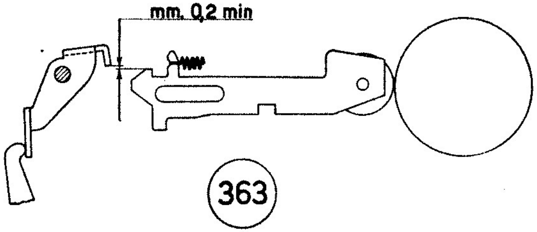
44 7 130 Y	Printing sliders control bridge
44 7 391 S	Printing plate control lever


44 7 130 Y
S
G
P
44 7 129 T
44 7 391 S
44 7 090 U

361


44 7 130 Y
S
G
44 7 126 Q
44 7 391 S

362


mm. 0,2 min

363

272 - FIGURES 364 - 365 - 366

Adjusting the printing of the sign C.

a) Clear the first register. Enter a figure and add it in the first register. Ask the total and see that the type-hammer of the sign C is stopped by the wing **A** *of the stay* 52 6 121 A *with an engagement of* 1 *mm. (minimum), figure* 365.

b) Enter a figure and subtract it in the first register. Ask the total and see that the type-hammer of the sign C passes above the stay 52 6 121 A *with a clearance of* 0.2 *mm. (minimum), figure* 366.

c) Both conditions described at points a) *and* b) *are obtained by acting on the bent* **K** *of the stay* 52 6 121 A.

d) Check furthermore that the cign C:

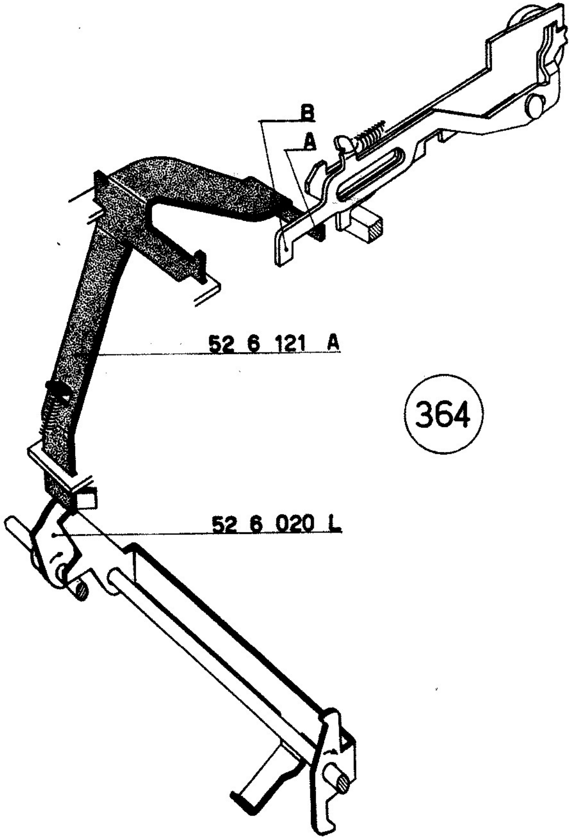
— is well printed in case of credit balance

— is not printed in case of positive balance.

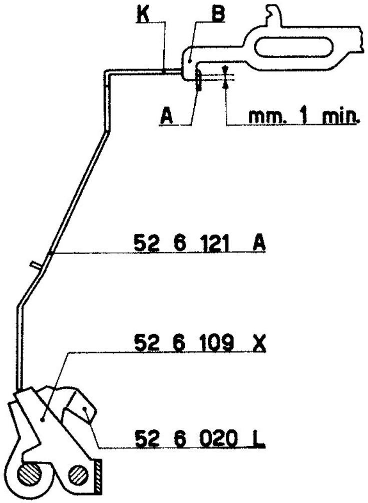
These conditions are obtained by acting on the wing **A** *of the stay* 52 6 121 A.

52 6 020 L	Hook bridge restoring lever
52 6 109 X	Credit balance transfer bridge
52 6 121 A	Printing control bridge for sign C

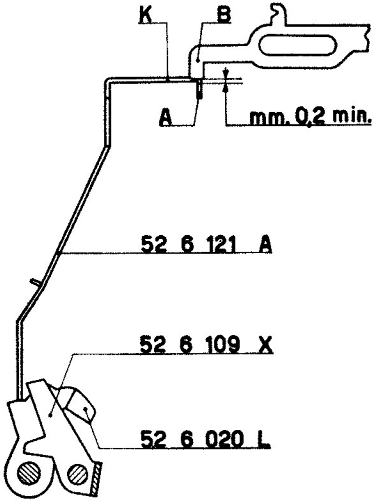
364


B
A
52 6 121 A
52 6 020 L

365


K
B
A
mm. 1 min.
52 6 121 A
52 6 109 X
52 6 020 L

366


K
B
A
mm. 0,2 min.
52 6 121 A
52 6 109 X
52 6 020 L

273 - Adjusting the printing during calculation.

Even during calculation the operations must be well printed up and down on the tape. If this is not, check again the vertical adjustment of the slide.

274 - FIGURE 367

Printing alignment.

The alignment test must be done by entering some 2, 5 *and* 8.

The alignment is obtained by acting suitably on the slots of the guide comb as illustrated in the figure and by means of the grip 7135396 H.

275 - Alignment of the 9.

Te 9 must be aligned with the other figures. If this is not, check again the vertical position of the racks guide lower comb.

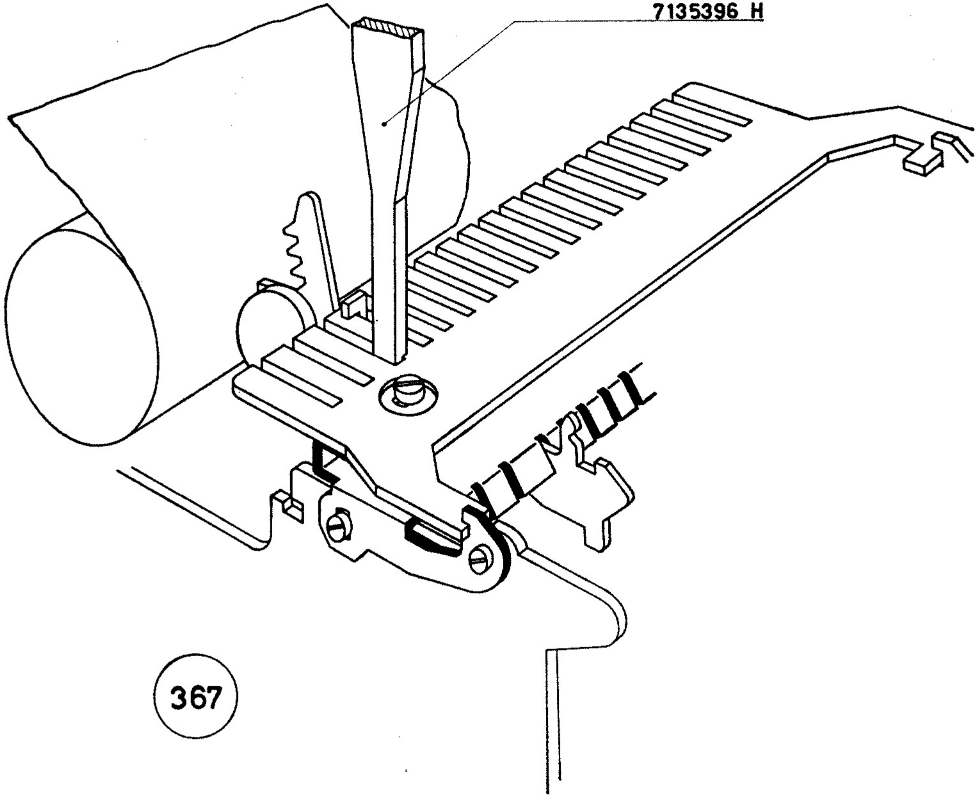
276 - Alignment of the special signs.

It is obtained as the alignment of the figures described in the paragraph 274.

277 - FIGURE 368

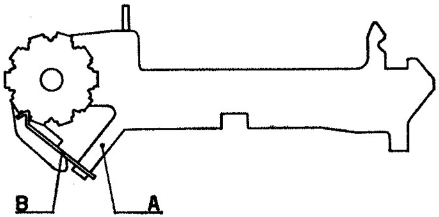
Alignment of the date sliders.

This alignment is obtained by acting suitably on the extension **A** *which, through the leaf-spring* **B**, *establishes the position of the wheels.*



367

368



278 - FIGURE 369

Assembling the key-stops and the keyboard upper plate.

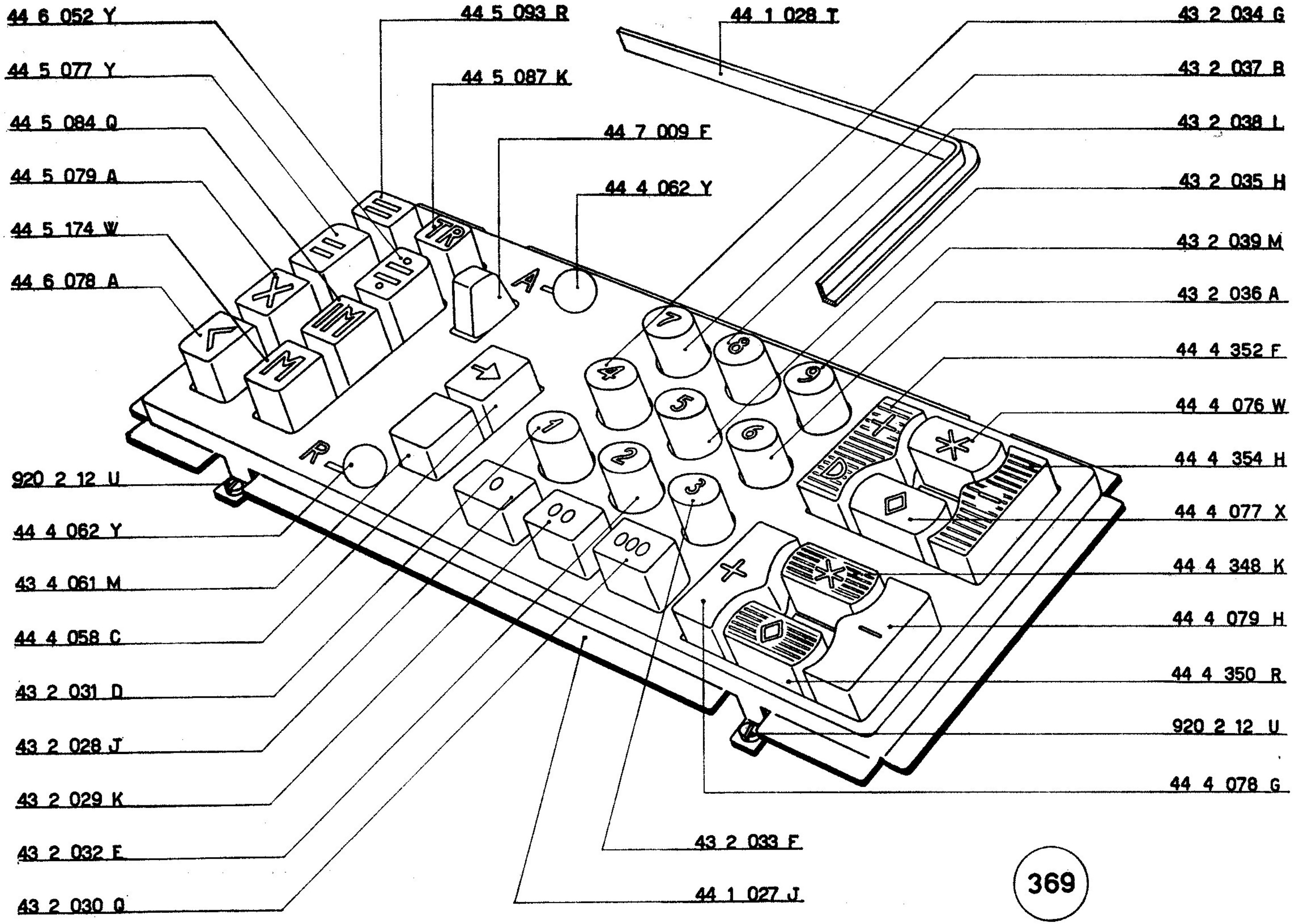
a) Fit on the proper stems all the numeral key-tops and motor-tops but the automatic and repeat buttons 44 4 062 Y.

b) Assemble the keyboard plate 44 1 027 J which should be secured to the plate below by means of four screws 920 2 12 U.

c) Fit the automatic and repeat buttons 44 4 062 Y.

d) Fit the insulating pad 44 1 028 T around the edges of the keyboard plate.

44 1 027 J	Keyboard upper plate
44 1 028 T	Insulating pad for keyboard plate
44 4 058 C	« Back-space » key-top
44 4 062 Y	« Automatic » and « repeat » buttons
44 4 076 W	First register total key-top
44 4 077 X	First register subtotal key-top
44 4 078 G	First register add key-top
44 4 079 H	First register subtraction key-top
44 4 348 K	Second register total key-top
44 4 350 R	Second register subtotal key-top
44 4 352 F	Second register add key-top
44 4 354 H	Second register subtraction key-top
44 5 077 Y	« Multiplication control » key-top
44 5 079 A	« Current multiplication » key-top
44 5 084 Q	« Memory input » key-top
44 5 087 K	« Cube » key-top
44 5 093 R	« Negative multiplication » key-top
44 5 174 W	« Memory reading » key-top
44 6 052 Y	« Division control » key-top
44 6 078 A	« Non-add » and « division stop » key-top
44 7 009 F	« Date » key-top
43 2 028 K	Key-top 0
43 2 029 K	Key-top 00
43 2 030 Q	Key-top 000
43 2 031 D	Key-top 1
43 2 032 E	Key-top 2
43 2 033 F	Key-top 3
43 2 034 G	Key-top 4
43 2 035 H	Key-top 5
43 2 036 A	Key-top 6
43 2 037 B	Key-top 7
43 2 038 L	Key-top 8
43 2 039 M	Key-top 9
43 4 061 M	« Clearing » key-top
920 2 12 U	Keyboard plate securing screw


44 6 052 Y
44 5 077 Y
44 5 084 Q
44 5 079 A
44 5 174 W
44 6 078 A
920 2 12 U
44 4 062 Y
43 4 061 M
44 4 058 C
43 2 031 D
43 2 028 J
43 2 029 K
43 2 032 E
43 2 030 Q
44 5 093 R
44 5 087 K
44 7 009 F
44 4 062 Y
44 1 028 T
A
R
43 2 034 G
43 2 037 B
43 2 038 L
43 2 035 H
43 2 039 M
43 2 036 A
44 4 352 F
44 4 076 W
44 4 354 H
44 4 077 X
44 4 348 K
44 4 079 H
44 4 350 R
920 2 12 U
44 4 078 G
43 2 033 F
44 1 027 J

369

279 - FIGURE 370

Assembling the dust protecting plate.

a) Place as illustrated in the figure the protecting plate 44 1 041 Y.

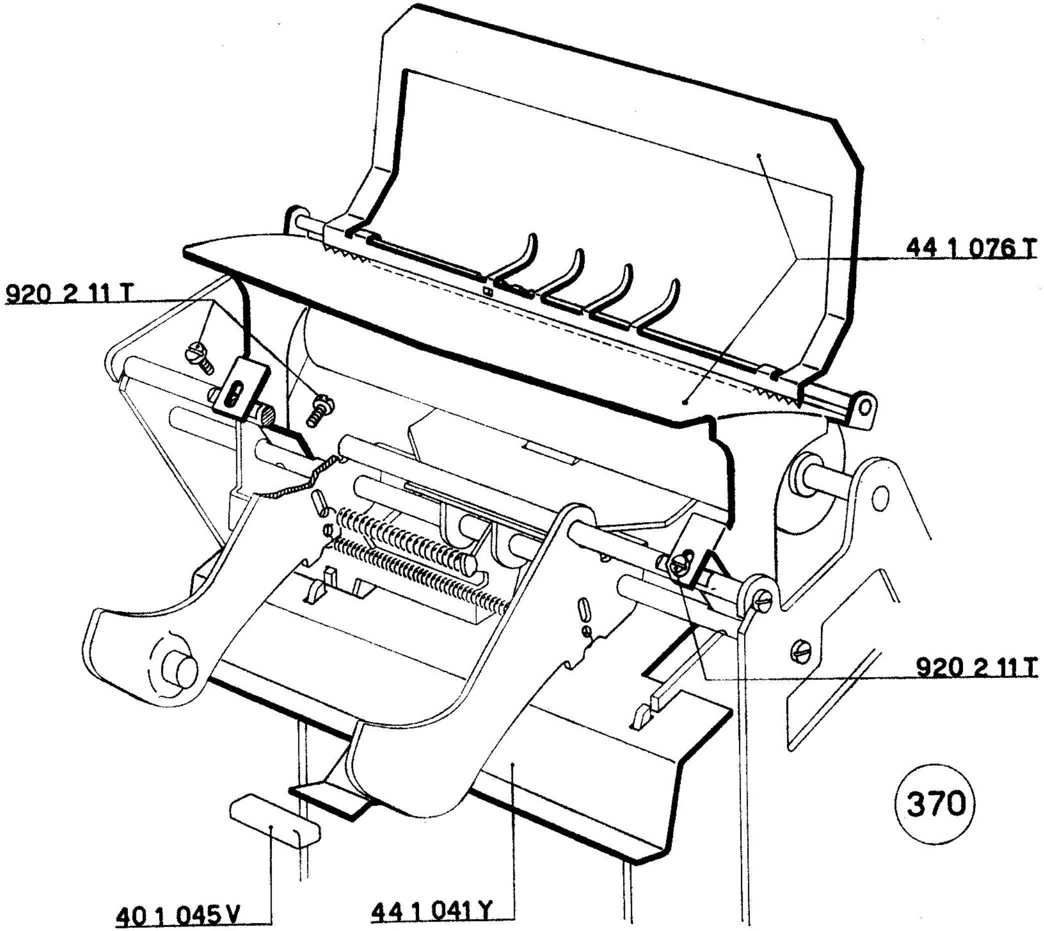
b) On the rear extension of the plate place the rubber pad 40 1 045 V.

280 - FIGURE 370

Assembling the paper supporting plate with decimal indicator and tape-cutter.

a) Assemble the plate 44 1 076 T as illustrated in the figure, by means of four screws 920 2 11 T. The plate should skim the platen.

44 1 041 Y	Protecting plate
44 1 076 T	Paper supporting plate with decimal indicator and tape-cutter
40 1 045 V	Rubber pad for 44 1 041 Y
920 2 11 T	Securing screw for 44 1 076 T


44 1 076 T
920 2 11 T
920 2 11 T
40 1 045 V
44 1 041 Y

370

281 - FIGURE 371

Assembling the bottom plate.

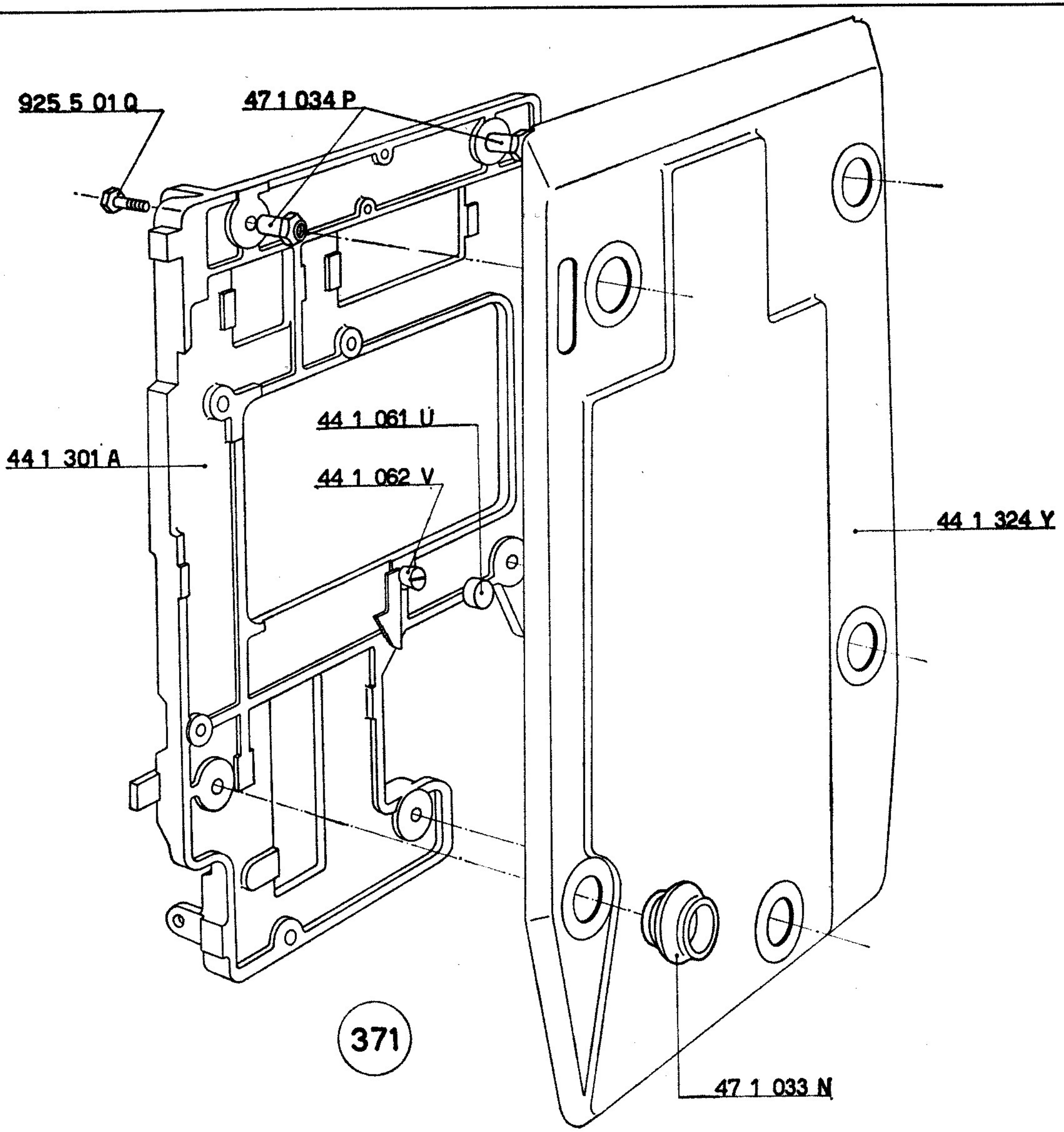
a) On the screw 44 1 062 V place the rubber pad 44 1 061 U.

b) In the two appropriate front holes of the base fit the feet 47 1 034 P securing them with the proper screws 925 5 01 Q.

c) In the five seats of the bottom plate 44 1 324 Y place the rubber feet 47 1 033 N.

d) Assemble the bottom plate so that the rubber feet 47 1 033 N are inserted in the proper supports 47 1 034 P.

44 1 061 U	Rubber pad for special screw
44 1 062 V	Special screw
44 1 301 A	Base
44 1 324 Y	Bottom plate
47 1 033 N	Foot
47 1 034 P	Foot support
925 5 01 Q	Securing screw for 47 1 034 P


925 5 01 Q
47 1 034 P
44 1 301 A
44 1 061 U
44 1 062 V
44 1 324 Y
47 1 033 N
371

282 - FIGURE 372

Assembling the casing.

a) On the five projections of the base place a rubber pad 43 1 032 D.

b) On the left external side-plate of the machine assemble the small plate 44 1 009 H by means of the two screws 920 3 02 F which should not be tightened right home.

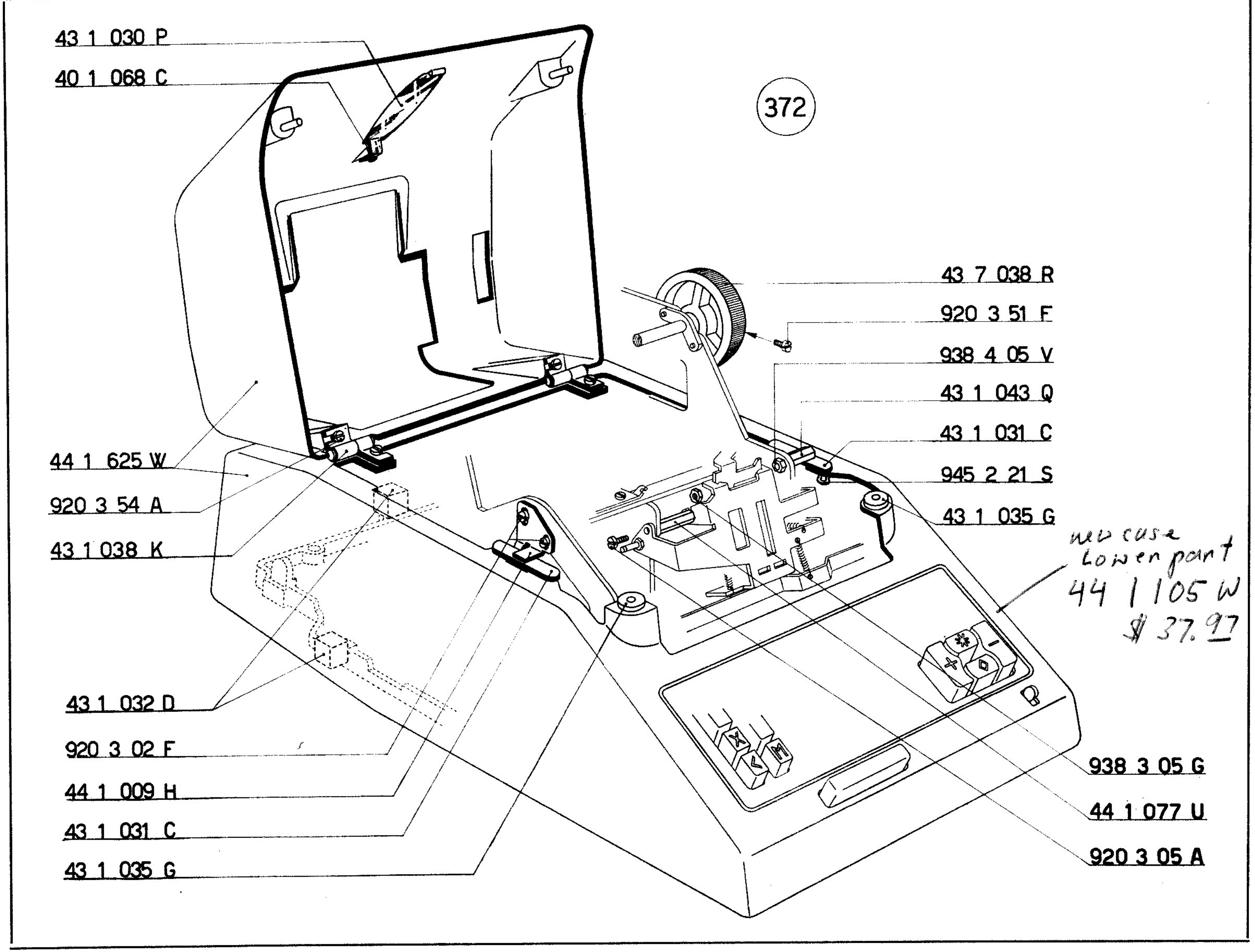
c) On the right external side-plate of the machine assemble the pivot 43 1 043 Q by means of the nut 938 4 05 V. The milled side of the pivot should be turned down; tighten the nut.

d) On the casing assemble by means of the spring-clips 945 2 21 S, the two casing securing locks 43 1 031 C.

e) Assemble the cover and adjust vertically the plate 44 1 009 H so that the casing is well closed.

f) Assemble on the platen shaft the platen knob 43 7 038 R with its screw 920 3 51 F.

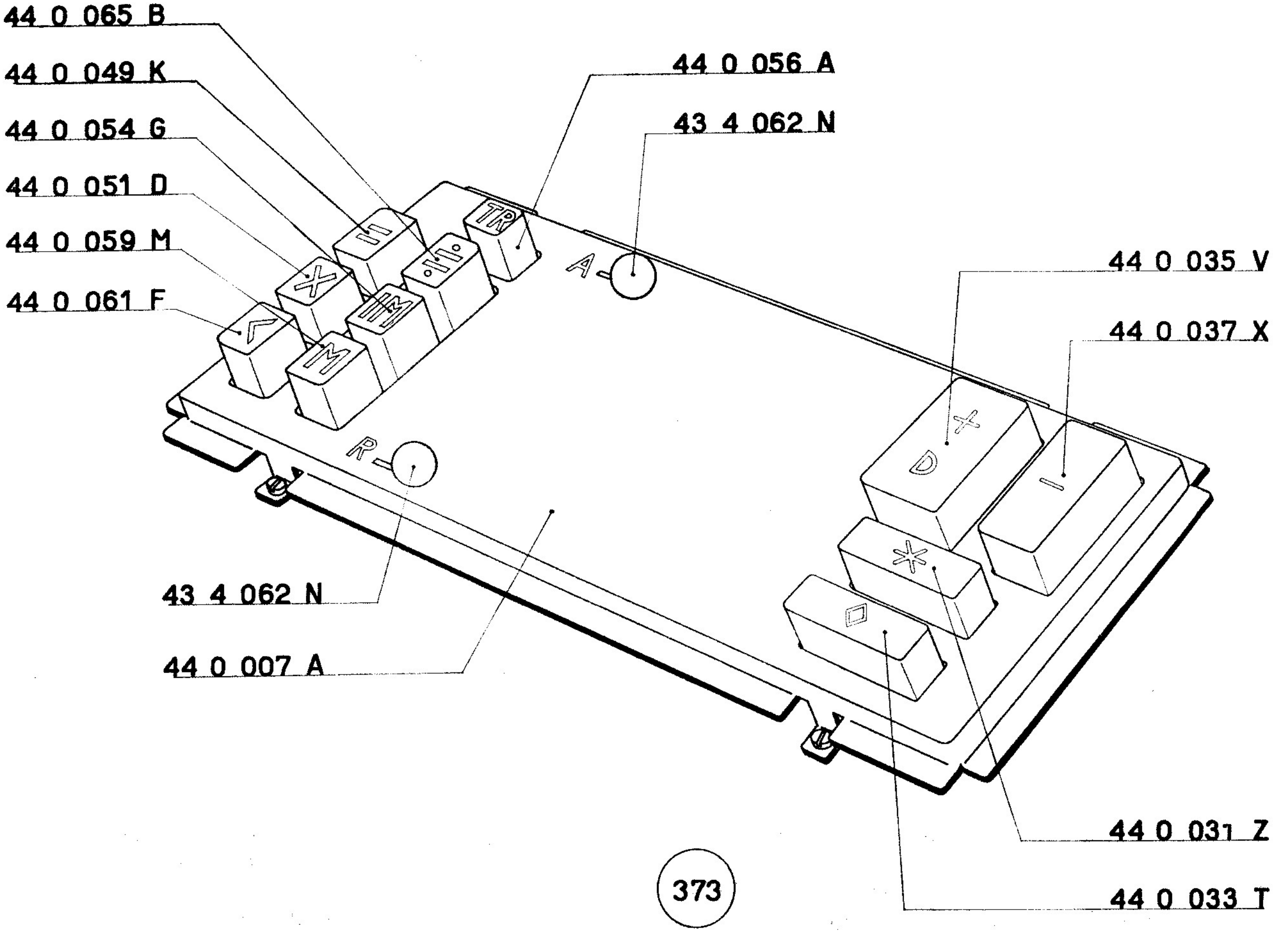
44 1 099 H	Left lock stop plate
44 1 077 U	Column
44 1 625 W	Complete casing
40 1 068 C	Screw for 43 1 030 P
43 1 030 P	Column indicator transparent plate
43 1 031 C	Casing securing lock
43 1 032 D	Rubber pad
43 1 035 G	Casing insulating pad
43 1 038 K	Casing complete hinge
43 1 043 Q	Right lock stop pivot
43 7 038 R	Platen knob
920 3 02 F	Screw for 44 1 099 H
920 3 05 A	Screw for 44 1 077 U
920 3 51 F	Screw for the knob
920 3 54 A	Screw for 43 1 043 Q
938 3 05 G	Nut for 44 1 077 U
938 4 05 V	Nut for 43 1 043 Q
945 2 21 S	Spring-clip


43 1 030 P
40 1 068 C
372
43 7 038 R
920 3 51 F
938 4 05 V
43 1 043 Q
43 1 031 C
945 2 21 S
43 1 035 G
44 1 625 W
920 3 54 A
43 1 038 K
43 1 032 D
920 3 02 F
44 1 009 H
43 1 031 C
43 1 035 G
938 3 05 G
44 1 077 U
920 3 05 A

new case
Lower part
44 1 105 W
$ 37.97

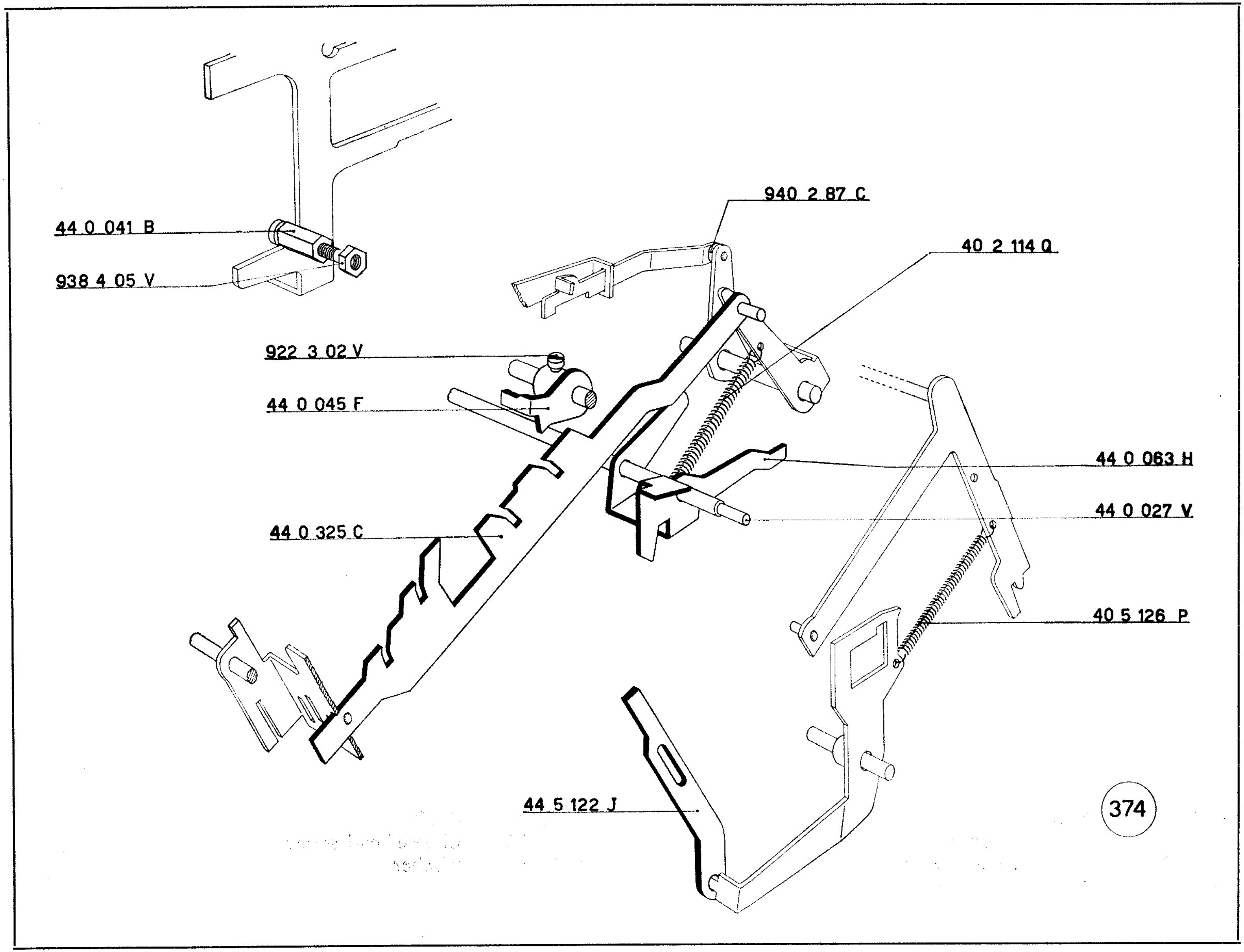
Parts of the « Divisumma 24 »

44 0 007 A	Keyboard plate
44 0 031 Z	« Total » key
44 0 033 T	« Sub-total » key
44 0 035 V	Add key
44 0 037 X	Subtraction key
44 0 049 K	« Multiplication control » key
44 0 051 D	« Current multiplier » key
44 0 054 G	« Memory input » key
44 0 056 A	« Cubature » key
44 0 059 M	« Memory reading » key
44 0 061 F	« Non-add » and « division stop » key
44 0 065 B	« Division control » key
43 4 062 N	« Automatic » and « repeat » key


44 0 065 B
44 0 049 K
44 0 054 G
44 0 051 D
44 0 059 M
44 0 061 F
44 0 056 A
43 4 062 N
TR
X
M
A
R
D
44 0 035 V
44 0 037 X
43 4 062 N
44 0 007 A
44 0 031 Z
44 0 033 T

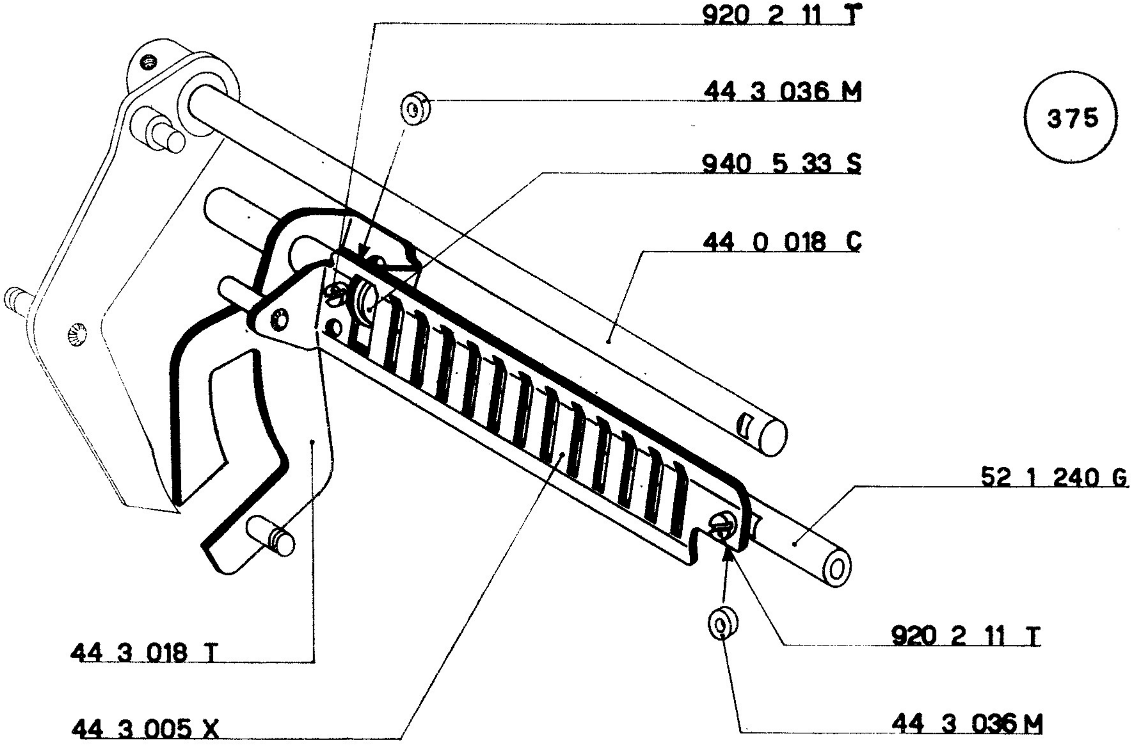
373

44 0 027 V	Shaft for small servomechanism transmission bracket
44 0 041 B	Guide pivot for register inversion control plate
44 0 045 F	Totals and calculation sliders control crank
44 0 063 H	Calculation slider stop
44 0 325 C	Credit balance slider
44 5 122 J	Servomechanism total key stay
40 2 114 Q	Spring for 44 0 063 H
40 5 126 P	Spring
922 3 02 V	Screw for 44 0 045 F
938 4 05 V	Nut for 44 0 041 B
940 2 87 C	Washer


940 2 87 C
40 2 114 Q
44 0 041 B
938 4 05 V
922 3 02 V
44 0 045 F
44 0 063 H
44 0 027 V
44 0 325 C
40 5 126 P
44 5 122 J
374

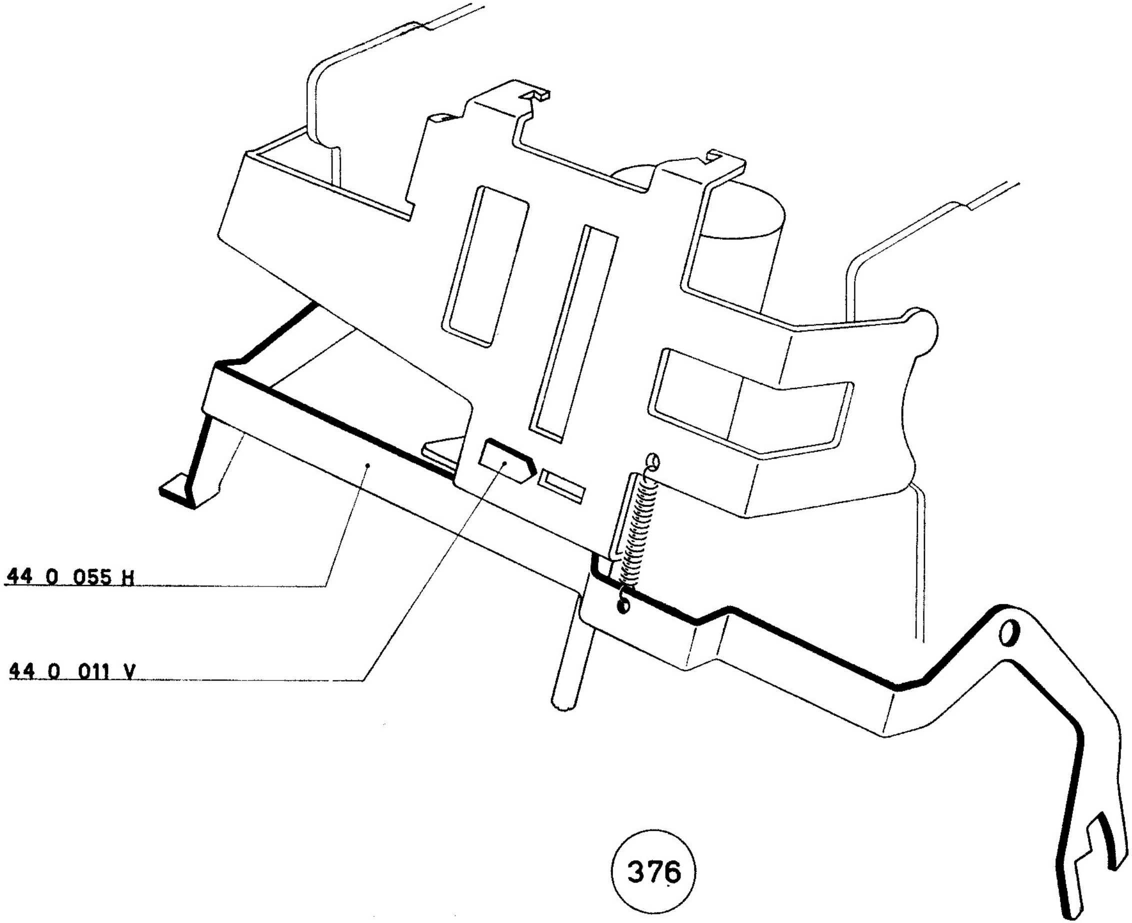
44 0 018 C	Shaft
44 3 005 X	Aligning comb
44 3 018 T	Aligning comb arm
44 3 036 M	Aligning comb spacer

52 1 240 G	Shaft
920 2 11 T	Cheese-head screw
940 5 33 S	Washer

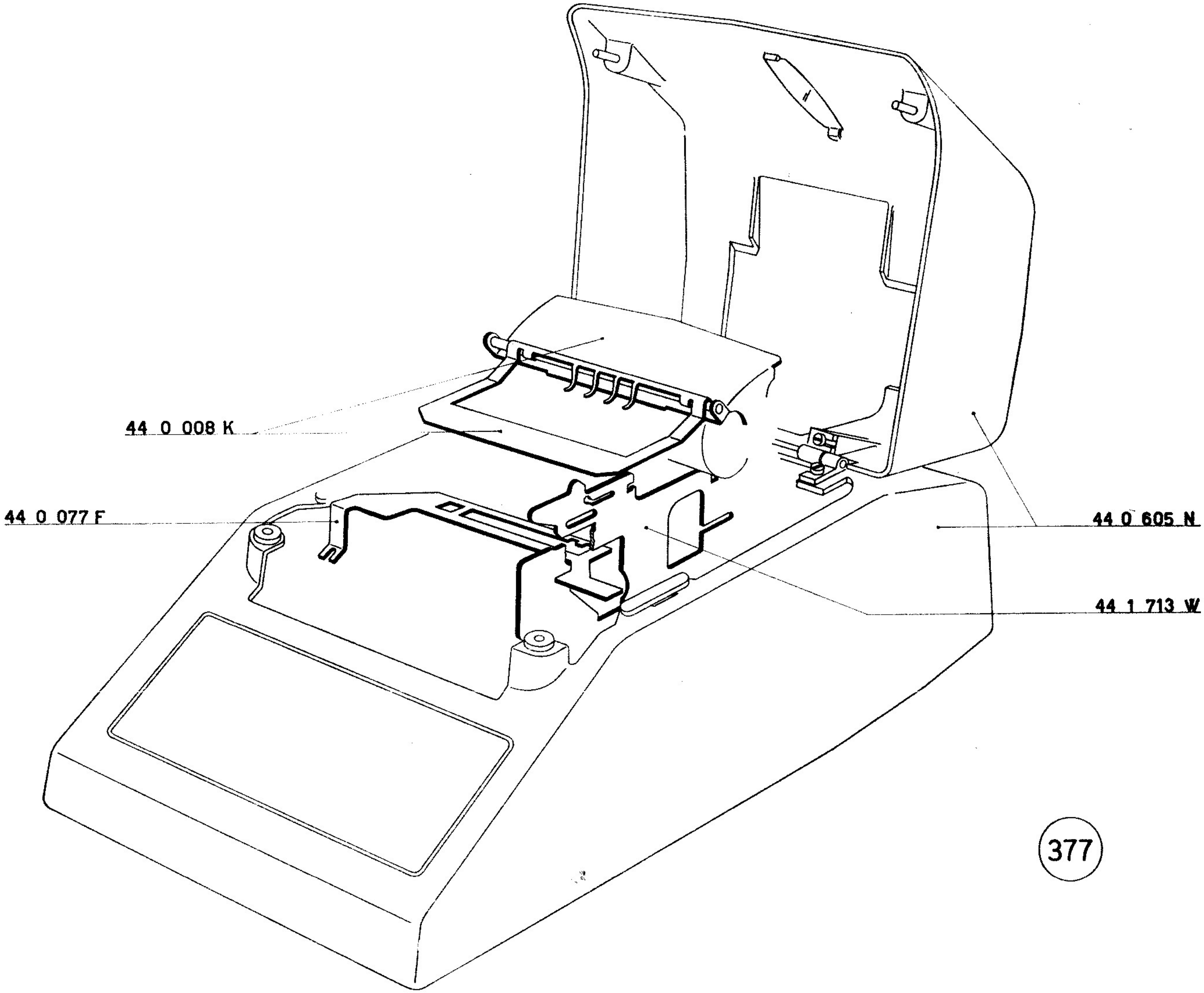

920 2 11 T
44 3 036 M
375
940 5 33 S
44 0 018 C
52 1 240 G
920 2 11 T
44 3 036 M
44 3 018 T
44 3 005 X

44 0 011 V Credit balance indicator opening-closing block

44 0 055 H Control bridge


44 0 055 H
44 0 011 V
376

44 0 008 K	Paper holding plate with paper-cutter and decimal indicator
44 0 077 F	Printing control plate
44 0 605 N	Complete casing
44 1 713 W	Right internal side-plate


44 0 008 K
44 0 077 F
44 0 605 N
44 1 713 W
377

Motors

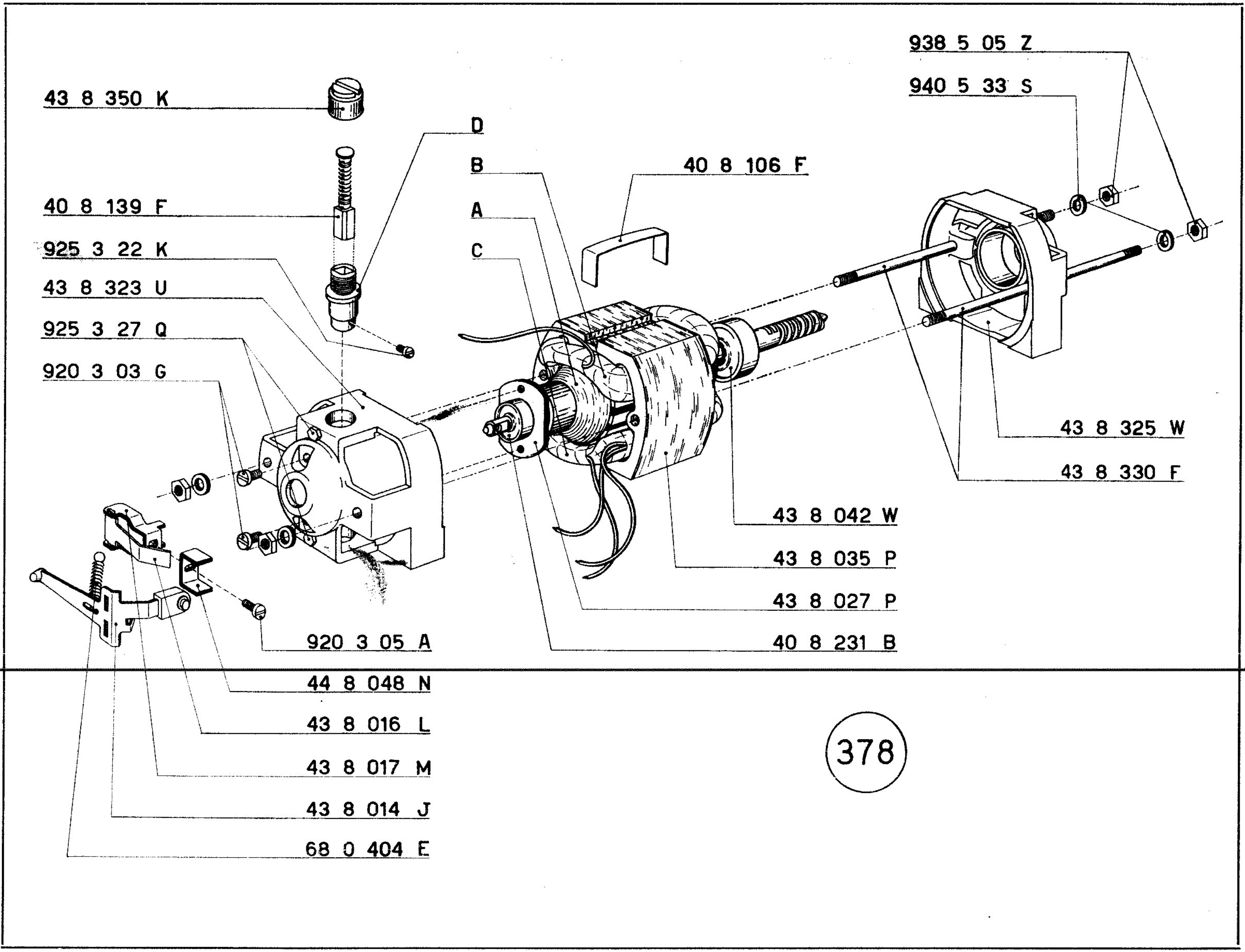
The have listed below the motors assembled on the Tetractys with the proper features.

Code number	Symbol	Tension	Frequency	Tension-switch	Filter
43 8 003 Y	N5 AZ 101	110÷160 180÷230	50 Hz	yes	no
43 8 156 V	N5 AZ 10 1 Trop.	110÷160 180÷230	50 Hz	yes	no
43 8 303 H	N5 AZ 501	110÷160 180÷230	50 Hz	yes	yes
43 8 157 W	N5 AZ 50 1 Trop.	110÷160 180÷230	50 Hz	yes	yes
43 8 160 D	N5 AZ 10 1 Peru	220 V	60 Hz	no	no
43 8 006 T	N5 AZ 1/6/Am	115 V	60 Hz	no	no
43 8 159 G	N5 AZ 1/6/Am Trop.	115 V	60 Hz	no	no
43 8 155 U	N5 AZ 1/6/Am Filter	115 V	60 Hz	no	yes
43 8 306 C	N5 AZ 50 1 Finland	110÷160 180÷230	50 Hz	yes	yes

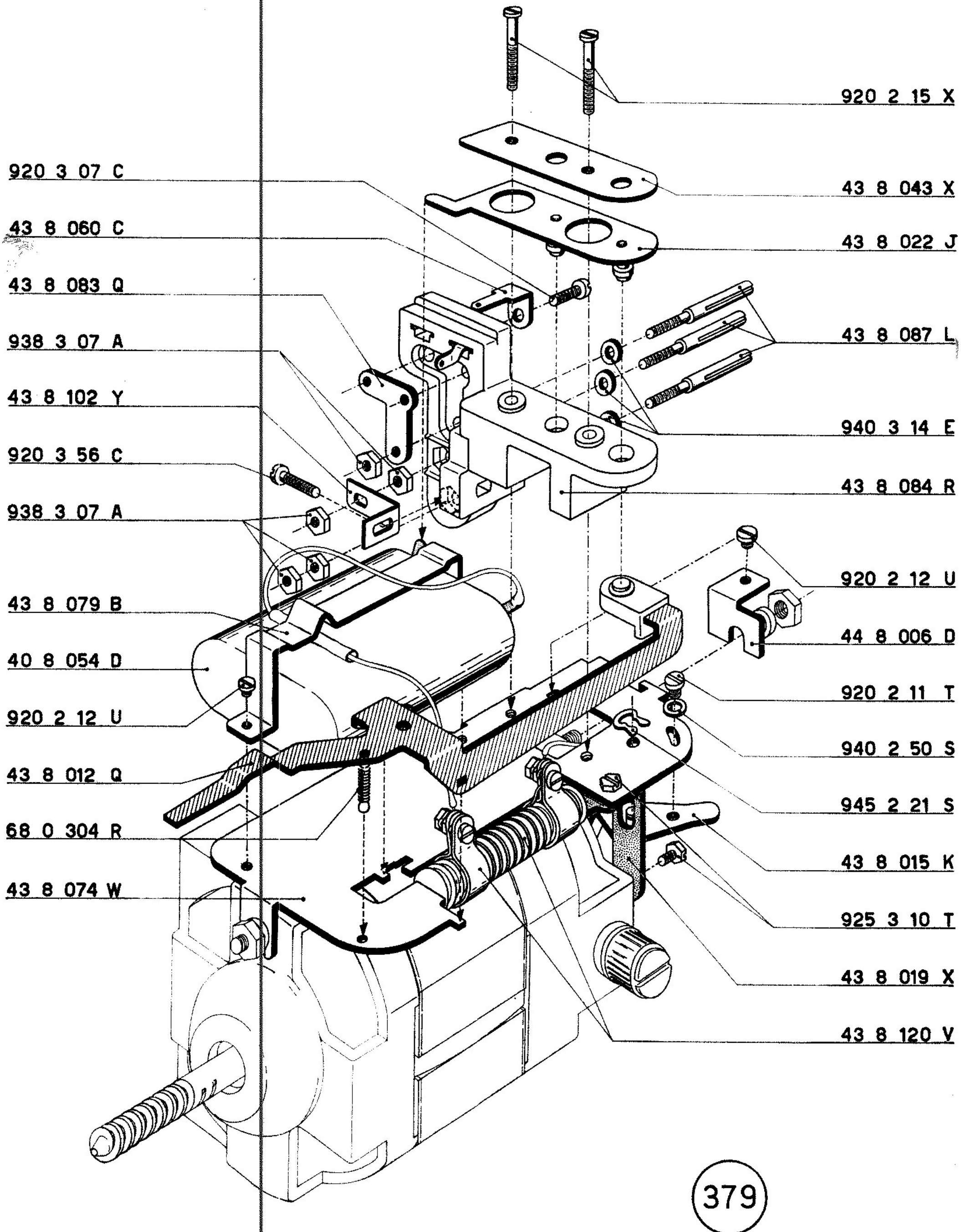
In the opposite page are illustrated the parts of the motor block. The parts identified by code number are fitted on all the motors.

The parts indentified a letter vary and their code numbers are listed below.

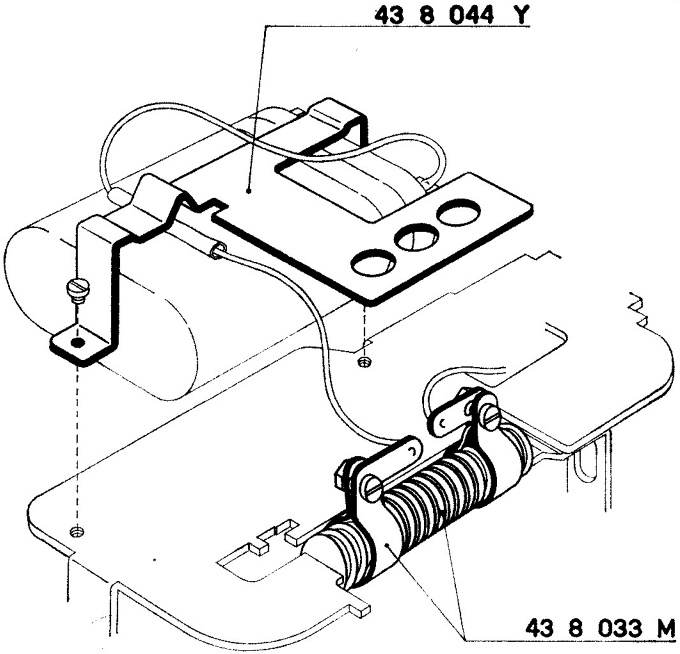
Motor	A=Armature	B=Upper winding	C=Lower winding	D=Brush-holder
43 8 003 Y	43 8 112 R	43 8 113 J	43 8 114 K	43 8 348 M
43 8 156 V	43 8 112 R	43 8 128 Z	43 8 129 S	43 8 348 M
43 8 303 H	43 8 112 R	43 8 113 J	43 8 114 K	43 8 348 M
43 8 157 W	43 8 112 R	43 8 128 Z	43 8 129 S	43 8 348 M
43 8 160 D	43 8 112 R	43 8 153 S	43 8 154 T	43 8 348 M
43 8 006 T	43 8 109 F	43 8 052 Y	43 8 053 Z	43 8 348 M
43 8 159 G	43 8 109 F	43 8 116 M	43 8 117 N	43 8 348 M
43 8 155 U	43 8 109 F	43 8 052 Y	43 8 053 Z	43 8 348 M
43 8 306 C	43 8 112 R	43 8 113 J	43 8 114 K	43 8 137 J


938 5 05 Z
940 5 33 S
43 8 350 K
D
B
40 8 106 F
A
40 8 139 F
925 3 22 K
C
43 8 323 U
925 3 27 Q
920 3 03 G
43 8 325 W
43 8 330 F
43 8 042 W
43 8 035 P
43 8 027 P
920 3 05 A
40 8 231 B
44 8 048 N
43 8 016 L
43 8 017 M
43 8 014 J
68 0 404 E
378

In the opposite page are listed the other parts of the motors without filter. (*)

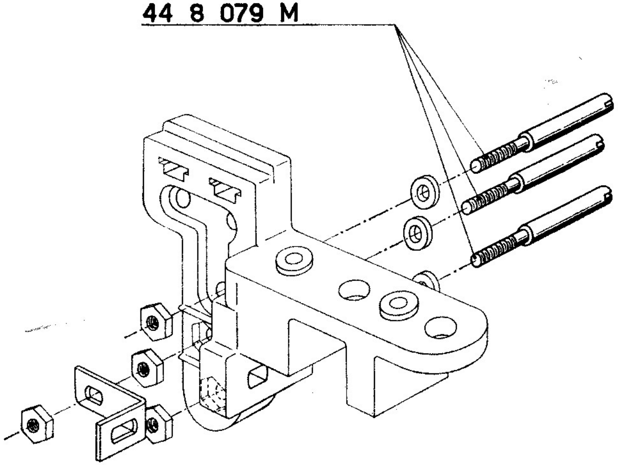

920 2 15 X
43 8 043 X
43 8 022 J
43 8 087 L
940 3 14 E
43 8 084 R
920 2 12 U
44 8 006 D
920 2 11 T
940 2 50 S
945 2 21 S
43 8 015 K
925 3 10 T
43 8 019 X
43 8 120 V
920 3 07 C
43 8 060 C
43 8 083 Q
938 3 07 A
43 8 102 Y
920 3 56 C
938 3 07 A
43 8 079 B
40 8 054 D
920 2 12 U
43 8 012 Q
68 0 304 R
43 8 074 W
379

(*) Please note that:
- for motors 43 8 006 T and 43 8 159 G the small plate securing the condenser (illustrated in the figure 380) varies;
- for motors 43 8 006 T and 43 8 159 G the resistance is the 43 8 033 M (figure 380);
- for motors 43 8 006 T and 43 8 159 G the pins are the 44 8 079 M (figure 381).


43 8 044 Y
43 8 033 M

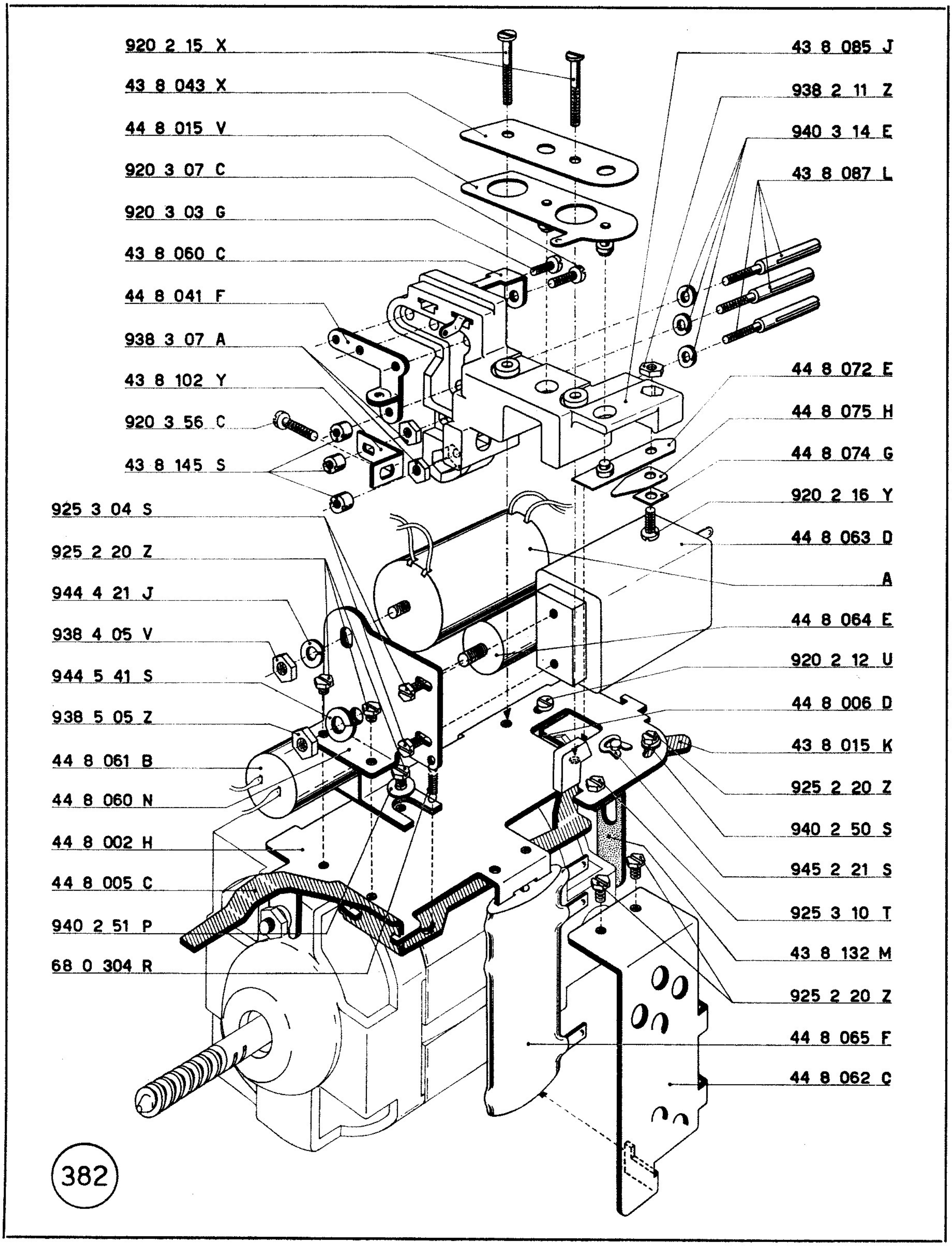
380

381



In the opposite page are listed the other parts of the motors with filters.

A	44 8 076 A	Armature for motors 43 8 303 M - 43 8 306 C - 43 8 157 W
	44 8 083 S	Armature for motor 43 8 155 U


920 2 15 X
43 8 043 X
44 8 015 V
920 3 07 C
920 3 03 G
43 8 060 C
44 8 041 F
938 3 07 A
43 8 102 Y
920 3 56 C
43 8 145 S
925 3 04 S
925 2 20 Z
944 4 21 J
938 4 05 V
944 5 41 S
938 5 05 Z
44 8 061 B
44 8 060 N
44 8 002 H
44 8 005 C
940 2 51 P
68 0 304 R
43 8 085 J
938 2 11 Z
940 3 14 E
43 8 087 L
44 8 072 E
44 8 075 H
44 8 074 G
920 2 16 Y
44 8 063 D
A
44 8 064 E
920 2 12 U
44 8 006 D
43 8 015 K
925 2 20 Z
940 2 50 S
945 2 21 S
925 3 10 T
43 8 132 M
925 2 20 Z
44 8 065 F
44 8 062 C

382

Testing

1) Remove the paper tape roll and the ribbon in use on the machine; replace them with a test roll and ribbon.
2) Check the speed of the machine which must effectuate 235 cycles per minute.
3) Check the operation of the « keyboard clearing » key and of the « back space » key.
4) Enter on the keyboard the serial number of the machine and print it on the tape by depressing the « non-add » key.
5) Make the following calculation tests:
   a) On the first register.

```
               * <
               < T
 111111111111 + <
 222222222222 + <
 333333333333 + <
 444444444444 + <
 555555555555 + <
 666666666666 + <
 777777777777 + <
 888888888888 + <
 999999999999 + <
4999999999995 ◇ <
4999999999995 * <
```

```
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
 999999999999 +<
            9 +<
9999999999999 ◇<
9999999999999 *<
```

```
  1 +<
  2 –<
  2 +<
  2 –<
  2 +<
  2 –<
  2 +<
  2 –<
  2 +<
  2 –<
1c◇<
  2 +<
  1 *<
```

```
999999999999 + <
999999999999 – <
555555555555 + <
555555555555 – <
111111111111 + <
111111111111 – <
   123456789 + <
   123456789 – <
   987654321 + <
   987654321 – <
               ◇ <
               * <
```

b) On the second register.

Effectuate the same tests as for the first register.

c) Testing the transfer of products in memory and testing the memory reading. To make this test it is necessary to operate the « automatic total » and the « automatic register transfer » levers. The operations must be made by depressing the key TR; effectuate the memory reading test at the end of the operations.

```
           < T
           * <
          9< < X
          1  =
          9< T X
          2  =
         18< T X
          3  =
         54< T X
          4  =
        216< T X
          5  =
       1080< T X
          6  =
       6480< T X
          7  =
      45360< T X
          8  =
     362880< T X
          9  =
    3265920< T X
         10  =
   32659200< T X
         11  =
  359251200< T X
         12  =
 4311014400< T X
         13  =
56043187200< T X
56043187200< < X
```

d) Testing the transfer of quotiens in addition on the first register. To make this test do not operate the « automatic total » and the « automatic register transfer » levers.

```
             < T
             * <
  1111111101 < +
  1111111101 < :
           9 < :
   123456789 < T
   123456789 + < X
  2222222202 > +
  2222222202 < :
          18 < :
   123456789 < T
   123456789 + < X
  3333333303 < +
  3333333303 < :
          27 < :
   123456789 < T
   123456789 + < X
  4444444404 < +
  4444444404 < :
          36 < :
   123456789 < T
   123456789 + < X
  5555555505 < +
  5555555505 < :
```

(*The operation continues on the next column*)

```
          45 < :
   123456789 < T
   123456789 + < X
  6666666606 < +
  6666666606 < :
          54 < :
   123456789 < T
   123456789 + < X
  7777777707 < +
  7777777707 < :
          63 < :
   123456789 < T
   123456789 + < X
  8888888808 < +
  8888888808 < :
          72 < :
   123456789 < T
   123456789 + < X
  9999999909 < +
  9999999909 < :
          81 < :
   123456789 < T
   123456789 + < X
  1111111101 * <
```

e) Testing the automatic transfer of products.
In this case the « automatic total » and « automatic register transfer » levers must be operated.

```
            * <
            < T
   123456789 < < X
           9   =
  1111111101 + T
          18   =
  2222222202 + T
          27   =
  3333333303 + T
          36   =
  4444444404 + T
          45   =
  5555555505 + T
          54   =
  6666666606 + T
          63   =
  7777777707 + T
          72   =
  8888888808 + T
          81   =
  9999999909 + T
 49999999545 * <
```

(This test must be done also by multiplying negatively)

f) Testing the positive and negative multiplication and the division. Do not operate the « automatic total » and « automatic register transfer » levers.

```
            < T
            + <
   123456789 < < X
          18   =
           9   x̲
  1111111101 < :
           9 < :
   123456789 < T
   925925925 < < X
          36   =
          27   x̲
  8333333325 < :
           9 < :
   925925925 < T
             < T
```

g) Testing the automatic transfer of quotients. To make this test do not operate the « automatic total » lever; operate the « automatic register transfer » lever.

```
          < T
          * <
1111111101 < +
1111111101 < :
         9 < :
 123456789 + T
2222222202 < +
2222222202 < :
        18 < :
 123456789 + T
3333333303 < +
3333333303 < :
        27 < :
 123456789 + T
4444444404 < +
4444444404 < :
        36 < :
 123456789 + T
5555555505 < +
5555555505 < :
```

(The operation continues on the next column)

```
        45 < :
 123456789 + T
6666666606 < +
6666666606 < :
        54 < :
 123456789 + T
7777777707 < +
7777777707 < :
        63 < :
 123456789 + T
8888888808 < +
8888888808 < :
        72 < :
 123456789 + T
9999999909 < +
9999999909 < :
        81 < :
 123456789 + T
1111111101 * <
```

h) Testing the automatic transfer of products and the transfer of products in the memory. In this case the « automatic total » and the « automatic register transfer » lever must be operated.

```
     < T
     * <
   9 < < X
   1   =
   9 + T
   9 * < X
   2   =
  18 + T
  18 * < X
   3   =
  54 + T
  54 * < X
   4   =
 216 + T
 216 * < X
   5   =
1080 + T
1080 * < X
   6   =
6480 + T
6480 * < X
```

```
          7   =
      45360 + T
      45360 * < X
          8   =
     362880 + T
     362880 * < X
          9   =
    3265920 + T
    3265920 * < X
         10   =
   32659200 + T
   32659200 * < X
         11   =
  359251200 + T
  359251200 * < X
         12   =
 4311014400 + T
 4311014400 * < X
         13   =
56043187200 + T
56043187200 * < X
```

(The operation continue on the next page)

Spare parts catalogue

44 0 019 D	Second register credit balance rocker, pages 348, 360
44 0 021 X	Crank for 44 0 019 D, pages 342, 348, 360
44 0 114 Z	Second register transmission sectors unit, page 166
44 1 008 G	Side-plates connecting shaft, pages 170, 526
44 1 009 H	Left lock stop plate, page 572
44 1 011 J	Side-plate connecting left column, page 172
44 1 014 M	Casing left support, pages 322, 438, 552
44 1 027 J	Keyboard plate, page 566
44 1 028 T	Keyboard plate insulating fitting, page 566
44 1 041 Y	Protecting plate, page 568
44 1 061 U	Rubber pad for special screw, page 570
44 1 062 V	Special screw, pages 448, 570
44 1 076 T	Paper plate with paper-cutter and decimal indicator, page 568
44 1 077 U	Column, page 572
44 1 301 A	Base, pages 158, 160, 302, 570
44 1 302 B	Left external side-plate, pages 204, 206
44 1 307 G	Right external side-plate, pages 216, 218, 248
44 1 324 Y	Bottom plate, page 570
44 1 603 H	Left internal side-plate, pages 158, 160
44 1 612 Z	Side-plates connecting right column, pages 212, 218
44 1 625 W	Complete casing, page 572
44 1 644 H	First register credit balance indicator bridge, pages 342, 344, 386
44 1 715 Y	Right internal side-plate, pages 170, 246
44 2 019 T	Keyboard universal bar plate, pages 236, 244, 268, 280, 286
44 2 021 M	Keyboard plate, pages 228, 230, 232, 236, 238, 240, 242
44 2 038 W	Slide shaft, page 266
44 2 043 T	Slide escapement fixed dog, pages 264, 280, 448, 486
44 2 050 E	Pawl control lever, pages 516, 518
44 2 052 U	Slide antirebounding pawl, pages 264, 268, 278, 516, 518
44 2 053 V	Slide shaft eccentric washer, pages 216, 266
44 2 054 W	Slide shaft guide left plate, pages 162, 276
44 2 055 X	Slide shaft guide right plate, pages 216, 276
44 2 058 A	Securing pin-screw for 44 2 054 W, page 162, 44 2 055 X, page 216

....	**44 2 071 X**	Shaft for 44 4 019 V, 44 5 072 T, page 218
....	**44 2 073 Z**	Slide transmission frame left arm, pages 220, 390
....	**44 2 074 S**	Slide transmission adjustable pivot, pages 160, 220
....	**44 2 077 V**	Slide stop cam, pages 266, 284
....	**44 2 079 F**	Stops clearing plate, pages 266, 272
....	**44 2 081 J**	Stops clearing plate guide pivot, pages 170, 266, 274
....	**44 2 082 K**	Repeat control bridge, pages 206, 304, 314, 390
....	**44 2 085 N**	Shock-absorber block, page 204
....	**44 2 086 P**	Shock-absorber block pivot, page 204
....	**44 2 316 Z**	Current-keyboard reciprocal locking rocker, pages 262, 286, 402, 488
....	**44 2 320 H**	Connecting lower stay, pages 236, 244, 448
....	**44 2 322 X**	Numeral key-stems guide vertical plate, pages 232, 236, 244, 246
....	**44 2 334 T**	Slide complete unit, pages 264, 266
....	**44 2 351 C**	Shaft for lever 44 2 050 E, page 516
....	**44 2 364 H**	Transmission bridge control lever, pages 206, 208, 220, 392, 416
....	**44 3 001 T**	Racks spring carrier comb, pages 168, 170
....	**44 3 002 U**	Main cam, pages 168, 194, 282, 450, 534
....	**44 3 008 A**	Racks guide lower comb, pages 168, 170, 174, 274
....	**44 3 009 B**	Racks stop upper shaft, pages 172, 174, 196, 208
....	**44 3 012 M**	Alignment connection connecting-arm, pages 164, 176
....	**44 3 013 N**	Racks guide lower shaft, pages 168, 170
....	**44 3 014 P**	Racks guide rear comb, pages 172, 208, 272, 436, 442
....	**44 3 016 R**	Alignment and shift control crank, pages 158, 160, 184, 186, 188
....	**44 3 017 J**	Shift bar control arm, pages 166, 176, 184, 186
....	**44 3 022 P**	Guide shaft for plates 52 1 194 F, 52 1 196 H, page 212
....	**44 3 023 Q**	13th rack, page 168
....	**44 3 025 J**	Shift control bar connection connecting-arm, pages 176, 186
....	**44 3 033 J**	Transmission sectors shafts securing plate, pages 170, 344
....	**44 3 047 Y**	First register transmission sectors unit, page 166
....	**44 3 049 A**	Second register transmission levers unit, page 164
....	**44 3 051 U**	Register wheel, page 178
....	**44 3 061 W**	Register shafts securing screw, page 178
....	**44 3 063 Y**	Register left pivot, pages 180, 196
....	**44 3 065 S**	Register right pivot, pages 178, 180, 196

44 3 067 U	Registers stabilizing plate, pages 190, 198
44 3 068 D	First register credit balance rocker, pages 336, 356
44 3 071 Y	First register credit balance rocker control crank, pages 328, 356, 378, 382, 394
44 3 073 S	Washer (if necessary), page 178
44 3 084 N	Shaft for bridge 52 6 118 P, pages 224, 382
44 3 311 V	Transmission levers guide comb, page 164
44 3 355 H	Register guide and stop block, pages 158, 164, 180, 196
44 3 360 J	Locking bar, pages 178, 194
44 3 374 C	Complete register, page 178
44 3 386 Z	Locking bar left rocker, page 178
44 3 387 S	Locking bar right rocker, page 178
44 4 001 U	First register « sub-total and total », « memory reading » key-stem, pages 226, 228, 230, 298
44 4 002 V	Second register « sub-total », « division control » key-stem, pages 266, 228, 230, 302, 324, 476
44 4 003 W	Second register « total » key-stem, pages 230, 490
44 4 004 X	« Memory input » key-stem, pages 226, 228, 312
44 4 006 Z	« Multiplier control » key-stem, page 226
44 4 007 S	« Non-add » and « division stop » key-stem, pages 226, 252, 256
44 4 008 B	First register « subtraction » key-stem, pages 230, 352, 354
44 4 012 N	Totals universal bar slider, pages 216, 218, 246, 250, 288, 292, 294, 298
44 4 014 Q	First register « total » and « calculation » slider, pages 224, 246, 250, 298, 334, 336, 368, 370, 374, 422
44 4 015 R	Second register « total » and « calculation » slider, pages 250, 300, 302, 334, 336, 368, 370, 372, 376, 422
44 4 016 J	Printing slider, pages 306, 308, 310, 312, 520
44 4 019 V	Starting lever, pages 218, 220, 250, 254, 288, 292, 294, 492, 496, 498
44 4 021 P	Keys guide left support, pages 240, 242, 304, 306, 310
44 4 028 W	« Non-print » and « repeat » release return lever, pages 238, 334, 336, 350
44 4 029 X	« Subtraction » control left arm, pages 328, 346, 352, 358, 382, 384
44 4 032 J	Keys-guide right support, pages 230, 242
44 4 037 P	Printing and repeat slider restoring plate, pages 304, 306, 390, 510, 552
44 4 038 Y	Printing control plate transmission lever, pages 308, 520, 546

44 4 042 U Non-print and repeat crank, pages 334, 350, 542
44 4 043 V Sliders guide plate, pages 250, 298
44 4 047 Z Second register subtraction control right arm shaft, pages 342, 346, 358, 362
44 4 058 C « Back-space » key-top, page 566
44 4 062 Y « Automatic » and « repeat » key-buttons, page 566
44 4 072 S Sliders guide comb, page 336
44 4 076 W First register « total » key-top, page 566
44 4 077 X First register « sub-total » top, page 566
44 4 078 G First register « add » key-top, page 566
44 4 079 H First register « subtraction » key-top, page 566
44 4 084 P Guide column for plates 52 1 194 F, 52 1 196 H, page 212
44 4 088 T Register engagement and disengagement control frame left lever, pages 180, 196
44 4 091 N Registers stabilizer, pages 190, 198, 342
44 4 094 R Connecting-rod between selecting bridge and first register engagement control, pages 222, 374
44 4 095 J Connecting-rod between selecting bridge and second register engagement control, pages 222, 372
44 4 098 V Left arm for inversion in total control, pages 334, 366, 410
44 4 099 W Current control plate stay control lever, pages 288, 292, 294
44 4 100 G Register plate support pivot, pages 158, 180
44 4 101 V First register calculation sliders stop bridge, pages 298, 370
44 4 102 W Second register calculation slider stop arm, pages 298, 300, 302, 370
44 4 103 X Register carrying plate, pages 176, 180, 190, 196, 198
44 4 104 Y Register carrying plate support pivot, pages 170, 180
44 4 105 Z Control plate, pages 260, 268, 282, 288, 292, 296, 328, 334, 350, 366
44 4 109 D Registers stabilizing rolle, pages 190, 198
44 4 111 N Sliders flexible rods guide plate, page 222
44 4 112 P Shaft for control plate dragging lever, page 290
44 4 113 Q Registers inversion control plate, pages 200, 326, 366
44 4 114 R Register inversion plate, pages 326, 328, 352, 358, 382
44 4 115 J Small guide shaft for register inversion plates, page 326
44 4 118 V Slider flexible rod, page 222
44 4 121 Q Totals and calculation sliders control crank, pages 334, 368, 370
44 4 127 N Shaft for memory unit and holding teeth carrying frame, page 272

44 4 131 J	Control plate stay control lever, pages 288, 292, 294
44 4 137 Q	Holding teeth carrying frame tube, page 270
44 4 148 B	Servomechanism total key stay, page 490
44 4 165 U	Racks universal bar bridge, pages 172, 200, 208
44 4 166 V	Shaft for racks universal bar bridge, pages 172, 218, 222
44 4 168 F	Racks frame leaf spring, page 172
44 4 170 D	Main connecting-rod lower crank, pages 158, 202
44 4 172 T	Shaft for lower crank, pages 158, 206, 416
44 4 178 H	Forward cam for 44 4 105 Z, pages 212, 290, 296
44 4 186 J	Carrying shaft for printing sliders restoring plate rollers, page 200
44 4 188 U	Roller for printing sliders restoring left plate, page 200
44 4 189 V	Ring for 44 3 016 R, page 158
44 4 305 H	« Multiplication control » key-stem, pages 226, 228, 402, 412, 488
44 4 313 Y	Credit balance slider, pages 224, 246, 250, 364, 382, 384
44 4 324 T	Clutch control right slider, pages 250, 252, 254, 262, 286
44 4 325 U	Crank for 44 4 324 T, pages 242, 250, 252
44 4 327 W	Clutch control left slider, pages 240, 242, 252, 256, 258
44 4 334 V	First register subtraction control right arm, pages 328, 342, 352, 354, 492
44 4 346 H	Front add key transmission lever, pages 258, 376
44 4 348 K	Second register « total » key-top, page 566
44 4 350 R	Second register « sub-total » key-top, page 566
44 4 352 F	Second register « add » key-top, page 566
44 4 354 H	Second register « subtraction » key-top, page 566
44 4 361 G	Main cam, pages 186, 188, 202, 206, 208
44 4 363 A	Shaft, pages 262, 286
44 4 365 C	Printing and repeat sliders restoring plate com-arm, page 304
44 4 382 W	Control cam for plates 52 1 194 F, 52 1 106 H, page 212
44 4 396 U	Register inversion control plate support column, page 158
44 4 407 Y	Control plate stay, pages 288, 292, 294, 296
44 4 416 Q	Shaft for total inversion control right arm pages 292, 296, 334, 366, 368, 410
44 4 419 T	Register carrying plate cam, page 176
44 4 425 R	Holding teeth carrying frame, pages 270, 272
44 4 428 U	Holding teeth shaft, pages 270, 272

44 4 438 W	Holding teeth carrying frame tube, page 270
44 4 440 C	Servomechanism bridge restoring and control plate transmission cam, pages 288, 290, 292, 294, 492, 498, 500
44 4 463 X	Main connecting-rod, pages 202, 208
44 4 464 Y	Main connecting-rod upper crank, pages 202, 208
44 4 477 V	Clutch leaf spring, page 212
44 4 479 F	Clutch nut, page 212
44 4 689 A	Shaft with right lever for register engagement and disengagement control frame, pages 180, 190, 196, 198, 200, 222
44 4 692 V	Registers engagement and disengagement frames control bridge, pages 222, 372, 374
44 5 010 Z	Racks stabilizing tooth, pages 270, 412
44 5 011 N	Stabilizers teeth frame (front part), pages 270, 272, 412
44 5 013 Q	« Memory input » key-stem, page 312
44 5 014 R	Current control arm shaft, page 402
44 5 019 W	Small slide guide rear ring, page 430
44 5 020 T	Small slide shaft, pages 428, 470
44 5 021 Q	Small slide hooking tooth, pages 460, 464, 466, 468
44 5 022 R	Small slide hooking tooth pivot, page 460
44 5 029 Y	Entry control plate control upper arm, pages 454, 456
44 5 030 V	Entry control plate control lower arm, pages 454, 456
44 5 032 K	Entry control plate, pages 394, 414, 454, 456
44 5 033 L	External arm for entry control plate frame, pages 394, 400, 410, 412, 414, 430
44 5 034 M	Entry control plate frame crank, pages 394, 414
44 5 036 P	Entry control plate rear shaft, pages 394, 396, 448
44 5 037 Q	Entry control plate front shaft, page 394
44 5 038 Z	Multiplication connecting-rod, pages 400, 402, 412
44 5 039 S	Multiplier current control arm, pages 402, 404
44 5 041 U	Adjustable arm for multiplication stop control frame, pages 428, 480, 482
44 5 044 X	Small shaft for multiplication stop control frame, pages 428, 430, 434
44 5 047 S	Calculation bar left arm, pages 430, 482, 484
44 5 048 B	Calculation bar right arm, pages 430, 470, 476
44 5 049 C	Calculation bar shaft, pages 430, 470

44 5 051 W	Calculation connecting-arm, pages 470, 476, 482
44 5 052 X	Non-add bar, pages 402, 404, 474, 476
44 5 053 Y	Subtraction stop exclusion bridge, pages 430, 480
44 5 054 Z	Stroke-counter testing hook lever control bridge, page 444
44 5 055 S	Small support shaft for hook lever control bridge, page 444
44 5 056 T	Special pin-screw, pages 158, 160, 206
44 5 057 U	Stroke-counter testing hook lever, pages 396, 398, 444, 484
44 5 058 D	Shaft for stroke-counter testing hook lever, pages 396, 472
44 5 060 B	Shaft for multiplication stop control lever, pages 416, 418, 480
44 5 062 Z	Stroke-counter frame, pages 396, 436
44 5 063 S	Stroke-counter bridge, pages 396, 448, 484, 486, 488
44 5 066 V	Pivot for 44 5 365 D, page 448
44 5 067 W	Stabilizers teeth frame (rear part), page 270
44 5 068 F	Racks stop connecting-arm for negative and positive multiplication symbols, page 448
44 5 072 T	Second register subtraction control selector, pages 218, 288, 290, 358, 362
44 5 075 W	Small slide shock-absorber, pag. 428
44 5 077 Y	« Multiplication control » key-top, page 566
44 5 079 A	« Multiplication current » key-top, page 566
44 5 080 Y	Left arm for multiplication stop control shaft, page 428
44 5 083 P	« Cubature » key-stem, page 226
44 5 084 Q	« Memory input » key-top, page 566
44 5 085 R	Multiplier slider control hook, page 298
44 5 087 K	« Cubature » button, page 566
44 5 090 S	Negative multiplication control bridge, page 410
44 5 091 P	Negative multiplication servomechanism hook, pages 206, 400
44 5 092 Q	« Negative multiplication » key-stem, page 226
44 5 093 R	« Negative multiplication » key-top, page 566
44 5 099 X	Multiplication signs control return lever, pages 158, 448
44 5 100 H	Special pivot for 44 5 091 P, pages 206, 304
44 5 113 R	Stroke-counter frames control cam, pages 202, 208, 398, 484
44 5 114 J	Stroke-counter frames control arm, pages 170, 396, 398, 484
44 5 120 U	Servomechanism hook, pages 492, 498
44 5 123 K	Servomechanism selecting rod, pages 492, 496
44 5 127 P	Servomechanism totals control arm, pages 262, 286, 328, 490, 492
44 5 128 Y	Servomechanism hook bridge, pages 268, 492

.... **44 5 130 W** Small servomechanism transmission bracket, pages 492, 494, 496

.... **44 5 131 K** Totals selecting slider (with transfers), page 490

.... **44 5 132 L** Shaft for rod control right arm, pages 242, 252, 298, 300, 302, 412, 490

.... **44 5 133 M** Servomechanism selecting stay control left arm, pages 298, 300, 302, 404, 474, 476

.... **44 5 135 P** Servomechanism control bridge, pages 402, 420, 492, 494, 496

.... **44 5 136 Q** Current left crank, pages 302, 314, 324, 402, 406, 412

.... **44 5 139 T** Cypher entry plate, pages 244, 262, 448, 486, 506

.... **44 5 140 G** Small slide restoring first control lever, pages 454, 456, 462

.... **44 5 142 W** Slide movement second transmission lower arm shaft, pages 460, 462

.... **44 5 143 X** Slide movement second transmission upper arm, pages 460, 464

.... **44 5 147 T** Small racks clearing and multiplication memory slider, pages 226, 242, 298

.... **44 5 148 C** Memory connecting-arm and slider connecting bridge, pages 298, 406, 408, 424

.... **44 5 149 D** Engagement anchor control bridge, pages 318, 470

.... **44 5 150 A** Engagement anchor, pages 470, 472

.... **44 5 151 X** Engagement anchor bridge, pages 470, 472

.... **44 5 152 Y** Engagement control arm, pages 304, 318, 320, 472

.... **44 5 154 S** Small racks control engagement cam-lever, pages 320, 412, 472

.... **44 5 157 V** Small racks clearing control block, pages 404, 406, 408

.... **44 5 158 E** Small racks clearing control shaft, page 404

.... **44 5 159 F** Small racks clearing control lever, pages 404, 408, 438, 442

.... **44 5 160 C** Small racks clearing frame, pages 438, 442

.... **44 5 162 S** Small racks clearing shaft, pages 438, 442

.... **44 5 163 T** Small racks clearing frame shaft, page 438

.... **44 5 164 U** Side-plates connection support plate, pages 432, 460, 466

.... **44 5 165 V** Keys-guide support, pages 226, 228, 242, 298, 300, 314

.... **44 5 169 H** Automatic total exclusion bridge, pages 402, 422, 494

.... **44 5 170 E** « Automatic selection » key-stem, pages 238, 240, 242, 402

.... **44 5 172 U** Multiplication and division current slider, pages 242, 252, 256

.... **44 5 174 W** « Memory reading » key-top, page 566

.... **44 5 178 A** Right arms guide bracket, pages 246, 298, 328, 490, 492

.... **44 5 180 Z** Guide left comb, pages 302, 406, 420

.... **44 5 181 N** Subtraction arm, pages 346, 362, 478

.... **44 5 185 J** Small stay for current control arms spring, page 410

.... **44 5 186 K** Servomechanism bridge pivot, pages 160, 402

.... **44 5 190 T** Locking frame, pages 402, 406, 488

44 5 194 K	First register calculation slider stop, page 328
44 5 311 X	Division and multiplication cams unit, pages 416, 418, 472
44 5 342 E	Right arm for multiplication stop control shaft, pages 428, 430
44 5 359 P	Small racks clearing control cam, pages 202, 208, 398, 404, 408, 442, 484
44 5 365 D	Escapement control stay, pages 448, 486
44 5 369 R	Printing control hook, page 400
44 5 370 N	Non-add and subtraction control bridge, pages 400, 404, 410, 470, 474, 476, 478, 482
44 5 371 B	Ring, page 400
44 5 381 W	Small connecting-rod, page 410
44 5 386 T	First register slider stop control bridge, pages 342, 346, 386
44 5 398 F	Control bridge for negative and positive multiplication symbols, page 400
44 5 417 J	Multiplication tester and division connecting-rod control bridge, pages 416, 418, 440, 482
44 5 418 T	Small slide dragging comb, pages 428, 430, 434, 460, 464, 466, 468, 484, 504
44 5 419 U	Servomechanism, pages 492, 498, 500
44 5 421 N	Servomechanism hook rod, pages 492, 496, 498
44 5 435 L	Stop control arm, pages 430, 434, 436, 480
44 5 437 N	Division stroke-counter control and multiplication stop release lever, pages 396, 416
44 5 441 S	Small slide transmission connecting-rod, page 462
44 5 518 X	Memory unit, page 272
44 5 619 C	Small multipler slide unit, page 428
44 6 001 W	Slide stop arm carrying plate, pages 448, 450, 452
44 6 002 X	Automatic tabulation slide stop arm, pages 448, 450, 452
44 6 003 Y	Arm stop plate, pages 160, 452
44 6 004 Z	Current release bridge, pages 316, 324, 362, 448
44 6 005 S	Current control intercepted arm, pages 314, 316, 324, 362
44 6 006 T	Current control arm, pages 314, 324, 362, 408, 410
44 6 007 U	Division connecting-rod stop crank (current control), pages 314, 318, 324, 362, 418
44 6 008 D	Arm carrying plate control arm, pages 446, 450, 452
44 6 009 E	Slide stop arm guide plate dragging pawl, pages 446, 448, 452
44 6 010 S	Small pivot for 44 6 009 E, pages 446, 450, 452
44 6 011 P	Arm carrying plate control lever, pages 446, 450, 452, 506, 514
44 6 013 R	Arm carrying plate control stabilizer, pages 444, 446, 450, 452, 470
44 6 014 J	Automatic tabulation control lever, pages 396, 412, 416, 470

44 6 015 K	Automatic tabulation control anchor, pages 470, 506, 514
44 6 016 L	Anchor connecting-rod, page 470
44 6 017 M	Arm with shaft for stroke-counter, pages 436, 440, 470
44 6 018 W	Stroke-counter frame crank, pages 436, 440
44 6 021 R	Stroke-counter frame, pages 434, 436, 440
44 6 022 J	Quotient slide, pages 434, 460, 504
44 6 023 K	Small shaft for quotient slide, page 434
44 6 026 N	Division connecting-rod release bridge, pages 314, 324, 362, 418, 440
44 6 029 Z	Division connecting-rod control exceeding bridge, pages 316, 334, 508, 510, 512
44 6 030 W	Stroke-counter control lever, pages 430, 434, 436, 440
44 6 033 M	Division stop control arm, pages 416, 418, 508, 512
44 6 035 P	Division connecting-rod guide ring, pages 206, 318, 436
44 6 036 Q	Division sign connecting-rod, page 436
44 6 037 R	Partial restoring and printing control hook, pages 318, 436, 460, 512
44 6 038 S	Division stop connecting-rod, pages 322, 406
44 6 040 G	Partial restoring and printing control hook transmission bridge, pages 460, 512
44 6 043 X	Division connecting-rod hook, page 322
44 6 044 Y	Small racks clearing connection connecting-rod, pages 406, 408
44 6 045 Z	Totals universal bar left slider, page 300
44 6 048 C	Memory engagement control connecting-rod, pages 420, 424
44 6 049 D	Hook for memory engagement control connecting-rod, pages 420, 422, 424, 494
44 6 050 A	Automatic quotient arm, pages 406, 420, 422, 424, 494
44 6 052 Y	« Division control » key-top, page 566
44 6 053 Z	Memory engagement control connecting-rod control crank, pages 410, 420, 424, 552
44 6 054 S	Memory engagement connecting-rod guide pivot, pages 206, 316, 410, 420
44 6 055 T	Special hub for 44 6 029 Z, pages 334, 366
44 6 056 U	Sliders stop arm, pages 406, 422
44 6 058 E	Antirebounding pawl stop ring, pages 264, 268, 278, 518
44 6 059 F	Circular transmission exclusion control bridge, pagg. 342, 344, 504, 508
44 6 060 C	Hook bridge, pages 318, 342, 504, 508
44 6 062 S	Shaft for bridge 44 6 060 C, page 318
44 6 065 V	Shaft for entry control frame, page 394
44 6 075 X	Cyphers entry control bridge, pages 262, 506
44 6 078 A	« Non-add » and « division stop » key-top, page 566

44 6 080 Z	Servomechanism selecting rod hook, pages 492, 496
44 6 334 X	Division connecting-rod with stop pawl, pages 318, 324, 362, 416, 418, 440, 508, 510, 512
44 6 347 C	Totals universal bar frame shaft, pages 298, 300
44 7 005 T	Date printing slider, page 528
44 7 006 U	Date printing hook, page 522
44 7 007 V	Date key hooking slider, page 308
44 7 008 E	Date lever, pages 308, 310, 334, 366
44 7 009 F	« Date » key-top, page 566
44 7 023 L	Ribbon inversion rocker, pages 526, 554
44 7 024 M	Ribbon advance and stabilizer left pawl, page 526
44 7 025 N	Ribbon advance and stabilizer right pawl, page 526
44 7 036 R	Bicolour control rod, page 542
44 7 045 S	Line-space control lever, pages 548, 550, 552
44 7 046 T	Line-space stay, page 552
44 7 048 E	Line-space stay stabilizer, page 552
44 7 049 F	Threaded ring for 43 7 062 R, page 552
44 7 052 Z	Paper release bridge, pages 548, 550, 552
44 7 055 U	Spacing shaft, pages 548, 550
44 7 060 D	Line-space control lever, page 416
44 7 062 T	Ribbon reverse rocker stabilizer, page 526
44 7 063 U	Special spring-carrier, pages 386, 526
44 7 073 W	Printing control hook, page 522
44 7 076 Z	Special signs printing control hook, page 522
44 7 089 X	Shaft for printing control plate, page 520
44 7 090 U	Printing cam, pages 212, 516, 518, 558, 560
44 7 093 K	First register special signs selecting bridge, pages 214, 222, 224, 374
44 7 094 L	First register special signs rack, pages 168, 388
44 7 095 M	Second register special signs selecting bridge, pages 214, 222, 250, 372
44 7 096 N	First register signs slider control bridge, pages 214, 388
44 7 097 P	Second register signs slider control bridge, pages 214, 388
44 7 099 Z	Signs control bridges shaft, pages 214, 218
44 7 102 Z	Sliders and hooks guide comb shaft, pages 522, 524
44 7 103 S	Second register special signs racks, pages 168, 388
44 7 105 U	Figures printing slider with sign C for credit balance, page 528
44 7 120 W	Sliders guide upper comb, page 532
44 7 121 K	Printing sliders guide shaft, pages 528, 530

44 7 125 P	Shaft for printing sliders control bridge, page 538
44 7 126 Q	Printing hook bridge, pages 526, 560
44 7 127 R	Special column, pages 386, 526
44 7 128 S	Hook, page 522
44 7 129 T	Printing plate release control lever, pages 520, 542, 544, 558, 560
44 7 130 Y	Printing sliders control bridge, pages 538, 560
44 7 134 Q	Reinforcing rod, page 522
44 7 135 R	Second register special signs printing control hook, page 522
44 7 319 H	Left spool support plate, pages 540, 542
44 7 320 E	Right spool support plate, pages 540, 542
44 7 332 W	Spools support plates connecting bar, pages 540, 542
44 7 380 B	Figures printing slider, page 528
44 7 387 W	Printing control plate, pages 520, 524, 542, 544, 546
44 7 391 S	Printing control lever, pages 290, 544, 558, 560
44 7 671 A	Printing sliders and hooks guide comb, pages 522, 528
44 7 672 B	Sliders guide comb, pages 530, 532, 538, 556
44 7 683 X	Printing slider for sign « x », page 528
44 7 684 Y	Printing hammers restoring left plate, pages 200, 542
44 7 685 Z	Printing hammers restoring right plate, page 200
44 7 981 J	Second register special signs printing slider, page 528
44 7 982 K	First register special signs printing slider, page 528
44 8 002 H	Contacts support plate, page 596
44 8 005 C	Starting contact lever, page 596
44 8 006 D	Contacts support securing plate, pages 592, 596
44 8 015 V	Contacts connection conductor plate, page 596
44 8 022 U	Motor driving screw, page 426
44 8 041 F	Tension switch plate, page 596
44 8 048 N	Speed regulator counter-weight, page 590
44 8 060 N	Inductance and condensers support, page 596
44 8 061 B	Filter condenser, page 596
44 8 062 C	Resistance shield, page 596
44 8 063 D	Filter condenser, page 596
44 8 064 E	Filter condenser, page 596
44 8 065 F	Spark-extinguisher resistance, page 596
44 8 072 E	Starting contact plate, page 596
44 8 074 G	Securing square washer for leaf-spring, page 596

....	**44 8 075 H**	Starting contacts second leaf-spring, page 596
....	**44 8 076 A**	Filter inductance unit, page 596
....	**44 8 079 M**	Current plug-pin, page 594
....	**44 8 083 S**	Filter inductance unit (U.S.A.), page 596
....	**40 1 045 V**	Rubber packing for 44 1 041 Y, page 568
....	**40 1 068 C**	Screw for 43 1 030 P, page 572
....	**40 2 072 Z**	Screw for 44 4 325 U, page 242, 44 6 008 D, page 446
....	**40 2 136 N**	Roller for 44 4 186 J, page 200
....	**40 5 035 P**	Pivot, pages 206, 508
....	**40 7 041 X**	Roller for 44 4 396 U, page 158, 44 4 113 Q, page 200
....	**40 7 101 Z**	Roller for 44 2 364 H, page 206
....	**40 8 054 D**	Condenser, page 592
....	**40 8 106 F**	Stop plate, page 590
....	**40 8 139 F**	Carbon brush with spring, page 590
....	**40 8 231 B**	Bearing with ring, page 590
....	**43 1 016 D**	Ribbon advance pawls column, pages 170, 526
....	**43 1 017 E**	Column indicator drum support, pages 160, 258, 386
....	**43 1 018 P**	Column indicator drum (N), page 386
....	**43 1 019 Q**	Column indicator drum (K), page 386
....	**43 1 022 B**	Ratchet wheel for column indicator drum, page 386
....	**43 1 030 P**	Column indicator transparent plate, page 572
....	**43 1 031 C**	Casing securing lock, page 572
....	**43 1 032 D**	Rubber pad, page 572
....	**43 1 035 G**	Casing insulating ring, page 572
....	**43 1 038 K**	Casing complete hinge, page 572
....	**43 1 043 Q**	Right lock stop pivot, page 572
....	**43 1 059 Y**	Side-plates securing special screw, pages 158, 170, 206, 218
....	**43 2 001 Q**	Key-stem 1, page 232
....	**43 2 002 R**	Key-stem 2, page 232
....	**43 2 003 J**	Key-stem 3, page 232
....	**43 2 004 K**	Key-stem 4, page 232
....	**43 2 005 L**	Key-stem 5, page 232
....	**43 2 006 M**	Key-stem 6, page 232
....	**43 2 007 N**	Key-stem 7, page 232
....	**43 2 008 X**	Key-stem 8, page 232
....	**43 2 009 Y**	Key-stem 9, page 232
....	**43 2 010 L**	Key-stem 0, page 234

....	**43 2 011 H**	Key-stem 00, page 234
....	**43 2 012 A**	Key-stem 000, page 234
....	**43 2 014 C**	Current-keyboard reciprocal locking lever, pages 244, 248, 262, 286, 488
....	**43 2 015 D**	Pivot for 43 2 014 C, page 244
....	**43 2 023 D**	Connecting upper stay, page 232
....	**43 2 024 E**	Column for 44 2 320 H, page 236
....	**43 2 028 J**	Key-top 0, page 566
....	**43 2 029 K**	Key-top 00, page 566
....	**43 2 030 Q**	Key-top 000, page 566
....	**43 2 031 D**	Key-top 1, page 566
....	**43 2 032 E**	Key-top 2, page 566
....	**43 2 033 F**	Key-top 3, page 566
....	**43 2 034 G**	Key-top 4, page 566
....	**43 2 035 H**	Key-top 5, page 566
....	**43 2 036 A**	Key-top 6, page 566
....	**43 2 037 B**	Key-top 7, page 566
....	**43 2 038 L**	Key-top 8, page 566
....	**43 2 039 M**	Key-top 9, page 566
....	**43 2 064 N**	Slide stops leaf-spring, page 264
....	**43 2 067 R**	Stops leaf-springs securing shaft, page 264
....	**43 2 069 T**	1 st. left leaf-spring for slide stops, page 264
....	**43 2 074 Q**	Slide stop tooth, pages 264, 268, 278, 280, 284, 286, 392, 486
....	**43 2 075 R**	Slide guide and escapement plate, pages 264, 268, 272, 280, 284, 392, 448, 518
....	**43 2 076 J**	Escapement shaft, pages 264, 268
....	**43 2 082 H**	Back-space tooth, pages 204, 206, 220, 392
....	**43 2 085 C**	Slide transmission lever, pages 160, 220, 266, 386
....	**43 2 086 D**	Threaded pivot for slide transmission lever, page 160
....	**43 2 087 E**	Slide transmission frame and lever setting block, page 220
....	**43 2 096 F**	Rubber pad holding pivot for slide stop, pages 266, 284
....	**43 2 098 R**	Slide transmission rod, pages 206, 390
....	**43 3 055 N**	Spacing tube, page 178
....	**43 4 002 K**	« Back-space » and « clearing » key-stem, pages 240, 242, 252, 256, 390
....	**43 4 005 N**	Second register « add » key-stem, pages 230, 254
....	**43 4 013 D**	Repeat slider, pages 306, 390
....	**43 4 014 E**	Back-space tooth control lever, pages 220, 306, 392

43 4 016 G	« Repeat » key-stem, pages 238, 240, 242, 390
43 4 018 J	Repeat release plate, page 238
43 4 030 J	Lockings plate, pages 240, 242
43 4 061 M	« Clearing » key-top, page 566
43 4 077 M	Special spring holder, page 470
43 4 109 T	Clutch control hook in total, pages 216, 296
43 4 114 F	Special nut for 926 3 90 V, page 216, 44 4 105 Z, pages 260, 296, 322
43 4 121 E	Racks holding teeth leaf-spring, page 270
43 4 122 F	Racks holding tooth, page 270
43 4 137 E	Main racks frame bar, pages 172, 208
43 4 143 L	Main shaft, pages 186, 202, 208
43 4 144 M	Main shaft helicoidal wheel, pages 212, 426
43 4 154 P	Roller for 44 4 170 D, page 202
43 4 161 N	Perforating screw for 44 4 361 G, page 186, 44 4 464 Y, page 202, 43 4 450 U, pages 212, 220
43 4 341 S	Front add key-stem, page 258
43 4 342 T	Front add key, page 258
43 4 450 U	Disc with starting plate and dragging tooth, pages 212, 218, 220, 254, 426
43 4 698 Z	Control plate dragging lever, pages 290, 292, 294, 296
43 4 745 X	Clutch wheel with hub, page 212
43 7 026 D	Ribbon advance ratchet wheel, page 540
43 7 030 M	Left ribbon holding wing, page 540
43 7 031 A	Right ribbon holding wing, page 540
43 7 032 B	Column for 44 4 038 Y, page 308, 44 6 040 G, page 460, 43 7 026 D, page 540
43 7 035 E	Spool clutch leaf-spring, page 540
43 7 038 R	Knob, page 572
43 7 044 P	Platen stop plate, page 552
43 7 049 U	Line-space wheel stabilizing bridge, pages 548, 550, 552
43 7 051 N	Paper guide plate, page 548
43 7 054 R	Front paper-feed roller, page 548
43 7 055 J	Resr paper-feed roller, page 548
43 7 059 W	Left paper holding arm, pages 548, 550
43 7 060 T	Right paper holding arm, pages 548, 550
43 7 062 R	Line-space wheel stabilizing support, pages 548, 550, 552
43 7 073 L	Printing rack, pages 534, 536, 556
43 7 327 P	Left arm, pages 540, 554

43 7 328 Y	Right arm, page 540
43 7 329 Z	Ribbon guide pivot, page 540
43 7 334 N	Special pivot for 43 7 327 P, 43 7 328 Y, page 540
43 7 340 G	Complete platen, page 552
43 7 636 M	Arm guide special nut, page 540
43 8 003 Y	Complete motor, page 589
43 8 006 T	Complete U.S.A. motor, page 589
43 8 012 Q	Starting contact lever, pages 426, 592
43 8 014 J	Regulator contact lever with insulating pad, pages 426, 590
43 8 015 K	Speed adjustable plate, pages 592, 596
43 8 016 L	Regulator arm, pages 426, 590
43 8 017 M	Regulator arm support, page 590
43 8 019 X	Resistance securing plate, page 592
43 8 022 J	Contacts connection plate, page 592
43 8 027 P	Rear bearing stop ring, page 590
43 8 033 M	U.S.A. complete resistance, page 594
43 8 035 P	Leaf-plates pack, page 590
43 8 042 W	Ball bearing, page 590
43 8 043 X	Contacts protecting plate, pages 592, 596
43 8 044 Y	Resistance protection, page 594
43 8 052 Y	Upper winding for motors 43 8 006 T, 43 8 155 U, page 590
43 8 053 Z	Lower winding for motors 43 8 006 T, 43 8 155 U, page 590
43 8 060 C	Tension switch wire-holder, pages 592, 596
43 8 074 W	Contacts support plate, page 592
43 8 079 B	Condenser securing strip, page 592
43 8 083 Q	Tension switch plate, page 592
43 8 084 R	Plugs and contacts block (old model), page 592
43 8 085 J	Plugs and contacts block, page 596
43 8 087 L	Current male plug, pages 592, 596
43 8 102 Y	Ground plate, pages 592, 596
43 8 109 F	Armature for motors 43 8 006 T, 43 8 159 G, 43 8 155 U, page 590
43 8 112 R	Armature for motors 43 8 003 Y, 43 8 156 V, 43 8 303 H, 43 8 157 W, 43 8 160 D, 43 8 306 C, page 590
43 8 113 J	Upper winding for motors 43 8 003 Y, 43 8 303 H, 43 8 306 C, page 590
43 8 114 K	Lower winding for motors 43 8 003 Y, 43 8 303 H, 43 8 306 C, page 590
43 8 116 M	Upper winding for motor 43 8 159 G, page 590

43 8 117 N Lower winding for motor 43 8 159 G, page 590
43 8 120 V Complete resistance, page 592
43 8 128 Z Upper winding for motors 43 8 156 V, 43 8 157 W, page 590
43 8 129 S Lower winding for motors 43 8 156 V, 43 8 157 W, page 590
43 8 132 M Resistance securing plate, page 596
43 8 137 J Brush-holder for motor 43 8 306 Z, page 590
43 8 145 S Threaded collar for pins, page 596
43 8 153 S Upper winding for motor 43 8 160 D, page 590
43 8 154 T Lower winding for motor 43 8 160 D, page 590
43 8 155 U Complete U.S.A. motor with filter, page 589
43 8 156 V Complete tropical motor, page 589
43 8 157 W Complete tropical motor with filter, page 589
43 8 159 G Complete U.S.A. tropical motor, page 589
43 8 160 D Complete Peru motor, page 589
43 8 303 H Complete motor with filter, page 589
43 8 306 C Complete Finnish motor with filter, page 589
43 8 323 U Motor rear side-plate, page 590
43 8 325 W Motor front side-plate, page 590
43 8 330 F Motor connecting stay, page 590
43 8 348 M Brush-holder for motors 43 8 003 Y, 43 8 156 V, 43 8 303 H, 43 8 157 W, 43 8 160 D, 43 8 006 T, 43 8 159 G, 43 8 155 U, page 590
43 8 350 K Brush-holder cap, page 590
47 1 033 N Foot, page 570
47 1 034 P Foot ring, pages 160, 570
47 3 019 S Shaft, page 220
50 6 007 Z Special screw, pages 174, 272, 412
52 1 051 J Crank, pages 242, 252, 256
52 1 091 B Printing sliders restoring bar, pages 200, 524, 542
52 1 194 F Registers engagement control plate on the transmission unit, pages 212, 372, 374
52 1 196 H Registers engagement control plate on the racks, pages 212, 222, 372, 374, 376
52 1 255 T Shaft for 52 6 109 X, page 330
52 1 901 L Transmission levers unit (first register), page 164
52 2 027 B Repeat slider transmission bridge, pages 304, 306, 390
52 2 064 Q Special pivot for 44 2 082 H, pages 206, 304
52 6 020 L Hook bridge restoring lever, pages 334, 502, 562

.... **52 6 029 R** First register « add » key-stem, page 230
.... **52 6 034 E** Second register « subtraction » key-stem, pages 230, 358
.... **52 6 059 X** Indicator drum support, page 386
.... **52 6 107 M** First register credit balance indicator bridge, pages 334, 336, 338, 342, 344, 350
.... **52 6 108 W** Credit balance slider stabilizer, pages 216, 224, 364
.... **52 6 109 X** Credit balance transfer bridge, pages 330, 378, 380, 382, 384, 562
.... **52 6 110 K** First register subtraction control stay, pages 338, 380, 382
.... **52 6 111 G** Second register subtraction control stay, pages 338, 380, 384
.... **52 6 114 B** Second register subtraction control crank, pages 342, 384
.... **52 6 115 C** Reinforcing plate, pages 328, 330
.... **52 6 118 P** Credit balance control bridge, pages 224, 238, 380, 382, 384
.... **52 6 121 A** Printing control bridge for sign C, pages 502, 562
.... **52 6 122 B** Second register credit balance indicator bridge, pages 334, 338, 342, 344, 350
.... **52 6 123 C** Eccentric threaded pivot for 52 6 108 W, pages 216, 364
.... **52 6 413 F** Second register credit balance indicator, pages 342, 344

Springs

00 0 182 Z	Spring for 43 2 082 H, 52,6 118 P, 52 6 108 W, 44 4 001 U, 44 4 002 V, 44 4 003 W, 44 4 008 B, 43 4 005 N, 52 6 029 R, 52 6 034 E, 43 2 001 Q, 43 2 002 R, 43 2 003 J, 43 2 004 K, 43 2 005 L, 43 2 006 M, 43 2 007 N, 43 2 008 X, 43 2 009 Y, 43 2 010 L, 43 2 011 H, 43 2 012 A, 44 4 102 W, 44 6 043 X, 44 1 644 H, 52 6 107 M, 52 6 108 W, 44 4 313 Y, pages 204, 206, 224, 230, 232, 234, 300, 322, 342, 344, 364
40 2 114 Q	Spring for 943 1 21 L, 43 2 098 R, 43 4 013 D, 44 6 059 F, 44 5 143 X, pages 158, 206, 306, 342, 344, 460
40 2 115 R	Spring for 44 4 028 W, 44 4 042 U, 44 5 131 K, 44 4 038 Y, 44 4 016 J, 43 7 049 U, 44 7 045 S, pages 334, 490, 520, 548
40 2 145 X	Spring for slide rack, 44 5 021 Q, pages 264, 460
40 3 016 J	Spring for 44 2 052 U, 43 2 074 Q, 44 0 019 D, 44 0 021 X, 44 5 370 N, 44 6 080 Z, 44 5 130 W, 44 7 006 U, 44 7 073 W, 44 7 076 Z, 44 7 125 R, 44 7 128 S, pages 264, 268, 348, 400, 492, 522
40 3 021 P	Spring for 52 1 194 F, 52 1 196 H, 43 4 109 T, 44 4 012 N, 44 2 079 F, 44 4 425 R, 44 5 060 B, pages 212, 216, 266, 272, 416
40 4 052 X	Spring for first right sector and lever (second register) 44 4 001 U, 44 6 075 X, 44 6 004 Z, 44 5 437 N, 44 6 014 J, 44 5 123 K, 44 5 419 U, pages 164, 228, 262, 316, 396, 492
40 4 076 X	Spring for 44 7 007 V, 44 6 060 C, pages 308, 318
40 4 170 E	Spring for 44 5 072 T, 43 4 698 Z, 43 7 060 T, 44 7 052 Z, pages 290, 550
40 5 120 L	Spring for 43 2 085 C, page 160
40 5 121 J	Spring for 44 3 016 R, 44 3 017 J, 44 7 060 D, 44 2 364 H, 43 7 327 P, 43 7 328 Y, pages 158, 184, 416, 540
40 5 123 L	Spring for 43 4 450 U, 43 4 014 E, 52 6 413 F, 52 6 112 B, 44 5 062 Z, pages 170, 212, 220, 342, 344, 396
40 5 126 P	Spring for 44 6 044 Y, 44 6 038 S, 44 5 421 N, pages 406, 492
40 6 092 J	Spring for 43 7 049 U, page 552
40 7 013 K	Spring for 44 5 057 U, page 396
40 7 106 W	Spring for 44 4 305 H, page 228
40 7 108 G	Spring for 44 7 391 S, pages 290, 552
40 7 109 H	Spring for 43 4 030 J, 43 2 014 C, 42 2 316 Z, 44 4 324 T, 44 5 085 R, 44 6 334 X, 44 6 022 J, multiplier slide gauge, pages 242, 244, 248, 262, 298, 318, 434, 488
40 7 110 V	Spring for 44 0 114 Z, 44 6 026 N, 44 3 068 D, 44 5 386 T, 44 6 017 M, 44 6 030 W, stroke counter testing rod and hook, pages 166, 314, 336, 386, 436, 484
40 7 203 F	Spring for 44 7 052 Z, pages 548, 552
40 7 204 G	Spring for 44 5 418 T, 44 5 143 X, 44 6 015 K, pages 460, 470

40 8 052 B	Spring for 44 4 346 H, 44 4 334 V, 44 4 047 Z, 44 5 369 R, 44 5 091 P, 44 5 135 P, 44 6 050 A, 44 5 365 D, numeral printing slider with sign C for credit balance, 44 7 129 T, 44 7 020 V, 44 7 046 T, pages 258, 342, 400, 420, 448, 530, 542, 552
40 8 152 C	Spring for transmissions upper unit special sector 44 6 040 G, pages 386, 460
42 2 042 N	Spring for 44 4 006 Z, 44 4 007 S, 44 4 002 V, 44 4 004 X, 43 4 002 K, 43 2 074 Q, 44 2 043 T, 44 5 194 K, 44 5 127 P, 44 5 054 Z, 44 7 062 T, 44 7 024 M, 44 7 025 N, pages 226, 228, 240, 264, 328, 444, 526
42 4 040 S	Spring for 44 4 101 V, 44 5 053 Y, 52 6 121 A, pages 298, 430, 502
42 9 071 S	Spring for 44 5 041 U, page 428
44 5 012 P	Spring for stabilizing tooth, pages 270, 412
50 4 088 Y	Spring for 44 5 149 D, 44 5 370 N, page 470
50 4 089 Z	Spring for 44 2 050 E, page 516
68 0 202 K	Spring for 52 6 109 X, pages 330, 378
68 0 207 Q	Spring for 44 4 012 N, 44 5 131 K, 44 5 127 P, pages 214, 218, 490
68 0 303 Q	Spring for 44 5 170 E, 43 4 016 G, page 240
68 0 304 R	Spring for 44 5 013 Q, 43 8 012 Q, 43 8 074 W, 44 8 005 C, 44 8 060 N, pages 312, 592, 596
68 0 310 J	Spring for 44 3 002 U, 44 3 023 Q, 44 7 094 L, 44 7 103 S, page 168
68 0 312 G	Spring for 44 5 057 U, 44 5 063 S, page 396
68 0 313 H	Spring for 44 5 619 C, pages 428, 430
68 0 314 A	Spring for 44 5 3898 F, 44 5 091 P, 44 6 053 Z, 44 6 049 D, pages 400, 420
68 0 320 L	Spring for special numeral sliders for sign X, page 530
68 0 324 C	Spring for date printing sliders, page 530
68 0 326 E	Spring for 44 7 130 Y, page 538
68 0 328 Q	Spring for 44 6 002 X, page 448
68 0 401 B	Spring for 44 6 017 M, 44 5 435 L, page 436
68 0 402 C	Spring for 43 7 059 W, 43 7 060 T, page 550
68 0 403 D	Spring for 44 5 154 S, page 320
68 0 404 E	Spring for 43 8 014 J, 43 8 015 K, page 590
68 0 406 G	Spring for 44 7 019 Y, 44 7 020 V, page 542
68 0 409 K	Spring for 44 5 370 N, 44 5 090 S, page 410
68 0 410 F	Spring for 44 4 019 V, 44 4 324 T, page 250
68 0 411 U	Spring for 44 4 118 V, page 222

68 0 412 V	Spring for 44 3 067 U, 44 5 365 D, pages 190, 198, 448
68 0 415 Y	Spring for 44 4 016 J, page 306
68 0 417 S	Spring for 44 7 096 N, 44 7 093 K, 44 7 095 M, 44 7 097 P, page 214
68 0 422 X	Spring for 44 4 407 Y, page 288
68 0 502 G	Spring for 44 4 118 V, 44 5 151 X, 44 6 013 R, pages 222, 470
68 0 503 H	Spring for 44 4 091 N, pages 180, 190, 196, 198
68 0 504 A	Spring for 44 5 417 J, 44 6 334 X, page 416
68 0 510 B	Spring for 44 6 009 E, page 446
68 0 602 L	Spring for 43 2 075 R, pages 264, 274
68 0 604 N	Spring for 44 3 012 M, page 176
68 0 605 P	Spring for 44 4 098 V, 44 6 053 Z, page 410
68 0 706 L	Spring for 44 5 419 U, page 492
68 0 802 D	Spring for 44 5 150 A, 43 4 077 M, page 470
68 0 803 E	Spring for 44 6 006 T, page 410
68 1 104 W	Spring for 52 1 194 F, 52 1 196 H, page 212
68 1 201 F	Spring for locking bar, page 178
68 1 206 C	Spring for 44 5 032 K, page 394
68 1 215 U	Spring for 44 5 068 F, page 448
68 1 218 F	Spring for transmission sectors and levers, page 164

Standard parts

.... **920 2 11 T** Cheese-head screw, pages 230, 270, 336, 520, 524, 568, 592
.... **920 2 12 U** Cheese-head screw, pages 176, 228, 230, 232, 236, 242, 244, 250, 302, 334, 406, 438, 566, 592, 596
.... **920 2 15 X** Cheese-head screw, pages 592, 596
.... **920 2 16 Y** Cheese-head screw, pages 520, 536
.... **920 3 01 E** Cheese-head screw, page 160
.... **920 3 02 F** Cheese-head screw, pages 166, 168, 262, 264, 278, 320, 328, 334, 342, 394, 404, 414, 430, 432, 460, 470, 572
.... **920 3 03 G** Cheese-head screw, pages 170, 172, 222, 386, 402, 590, 596
.... **920 3 05 A** Cheese-head screw, pages 572, 590
.... **920 3 07 C** Cheese-head screw, pages 158, 532, 592, 596
.... **920 3 14 S** Cheese-head screw, page 530
.... **920 3 51 F** Cheese-head screw, pages 540, 542, 572
.... **920 3 52 G** Cheese-head screw, pages 302, 406, 550
.... **920 3 53 H** Cheese-head screw, page 260
.... **920 3 54 A** Cheese-head screw, pages 322, 572
.... **920 3 56 C** Cheese-head screw, pages 592, 596
.... **920 3 57 D** Cheese-head screw, page 248
.... **920 3 60 L** Cheese-head screw, page 400
.... **920 4 02 U** Cheese-head screw, page 206
.... **920 4 04 W** Cheese-head screw, pages 246, 248
.... **922 3 01 U** Cheese-head-set-screw, pages 212, 314, 416
.... **922 3 02 V** Cheese-head-set-screw, pages 178, 180, 196, 202, 240, 242, 272, 298, 302, 314, 328, 334, 342, 346, 394, 396, 406, 428, 430, 436, 446
.... **922 3 51 V** Cheese-head-set-screw, pages 186, 202, 212, 220, 288, 454, 460, 516
.... **922 3 52 W** Cheese-head-set-screw, page 416
.... **923 3 02 W** Grub-set-screw, page 334
.... **924 4 06 Q** Grub-screw, page 160
.... **925 2 12 M** Special screw, page 524
.... **925 2 20 Z** Special screw, page 596
.... **925 3 04 S** Special screw, page 596
.... **925 3 06 U** Special screw, pages 172, 208, 532
.... **925 3 10 T** Special screw, pages 592, 596
.... **925 3 12 R** Special screw, page 168

.... **925 3 22 K** Special screw, pages 262, 386, 590

.... **925 3 27 Q** Special screw, page 590

.... **925 3 36 R** Special screw, page 552

.... **925 3 51 Y** Special screw, pages 162, 206, 216, 218, 236, 266, 268

.... **925 3 57 W** Special screw, page 160

.... **925 5 01 Q** Special screw, pages 160, 570

.... **926 2 16 J** Stud screw, page 216

.... **926 3 01 Y** Stud screw, pages 446, 450

.... **926 3 17 P** Stud screw, pages 250, 254

.... **926 3 33 P** Stud screw, pages 220, 258

.... **926 3 54 U** Stud screw, page 190

.... **926 3 84 K** Stud screw, page 288

.... **926 3 90 V** Stud screw, page 216

.... **926 3 91 J** Stud screw, pages 158, 448, 550

.... **936 3 02 T** Threaded spring-holder, pages 172, 552

.... **938 2 11 Z** Nut, pages 216, 596

.... **938 3 05 G** Nut, pages 158, 170, 206, 244, 250, 258, 308, 386, 446, 448, 540, 548, 572

.... **938 3 07 A** Nut, pages 592, 596

.... **938 3 51 D** Nut, pages 160, 162, 170, 212, 216, 288, 492

.... **938 4 05 V** Nut, pages 158, 246, 248, 572, 596

.... **938 5 05 Z** Nut, pages 158, 160, 170, 206, 218, 590, 596

.... **938 5 06 S** Nut, pages 158, 160, 206

.... **938 7 01 D** Nut, page 206

.... **940 2 50 S** Washer, pages 592, 596

.... **940 2 51 P** Washer, pages 438, 596

.... **940 3 02 K** Washer, page 170

.... **940 3 03 L** Washer, page 460

.... **940 3 08 Z** Washer, page 532

.... **940 3 14 E** Washer, pages 548, 592, 596

.... **940 3 38 N** Washer, pages 172, 212

.... **940 3 39 P** Washer, pages 224, 318

.... **940 3 40 U** Washer, pages 420, 452

.... **940 3 48 Y** Washer, page 550

.... **940 3 62 N** Washer, pages 162, 540

940 3 66 J	Washer, pages 304, 490
940 3 75 K	Washer, page 216
940 4 04 A	Washer, page 470
940 4 61 A	Washer, page 214
940 5 04 E	Washer (if necessary), page 284
940 5 19 C	Washer, pages 180, 196
940 5 20 H	Washer, pages 266, 284
940 5 33 S	Washer, pages 214, 590
940 5 45 E	Washer, page 492
942 4 32 K	Collar, pages 262, 286
942 5 27 J	Collar, pages 334, 350
943 1 21 L	Sjring-holder pin, page 158
944 4 21 J	Split washer, page 596
944 5 41 S	Split washer, pages 160, 596
945 1 61 W	Spring clip, page 338
945 2 21 S	Spring clip, pages 158, 164, 176, 190, 198, 200, 204, 206, 222, 224, 238, 242, 250, 258, 272, 288, 298, 300, 304, 306, 318, 322, 326, 336, 396, 402, 404, 406, 410, 420, 428, 430, 436, 444, 448, 462, 470, 490, 492, 524, 526, 534, 542, 572, 592, 596
945 2 30 F	Spring clip, page 270
945 2 51 G	Spring clip, pages 164, 180, 196, 200, 204, 212, 218, 222, 224, 272, 308, 328, 330, 342, 386, 394, 400, 434, 436, 438, 460, 470, 526, 538
945 3 20 H	Spring clip, page 220
945 3 41 A	Spring clip, pages 170, 180, 196, 202, 218, 220, 224, 242, 244, 262, 266, 284, 290, 318, 320, 396, 410, 428, 446, 454, 470, 492, 516, 524, 526
999 1 67 T	Stud screw, page 198

Divisumma 24

44 0 007 A	Keyboard plate, page 576
44 0 008 K	Paper support plate with paper-cutter and decimal indicator, page 584
44 0 011 V	Credit balance window closing block page 582
44 0 018 C	Shaft, page 580
44 0 027 V	Shaft for servomechanism transmission bracket, page 578
44 0 031 Z	« Total » key, page 576
44 0 033 T	« Sub-total » key, page 576
44 0 035 V	« Add » key, page 576
44 0 037 X	« Subtraction » key, page 576
44 0 041 B	Guide pivot for register inversion control plate, page 578
44 0 045 F	Totals and calculation sliders control crank, page 578
44 0 049 K	« Multiplication control » key, page 576
44 0 051 D	« Current multiplication » key, page 576
44 0 054 G	« Memory input » key, page 576
44 0 055 H	Control bridge, page 582
44 0 056 A	« Cubature » key, page 576
44 0 059 M	« Memory reading » key, page 576
44 0 061 F	« Non-add » and « division stop » key, page 576
44 0 063 H	Calculation slider stop, page 578
44 0 065 B	« Division control » key, page 576
44 0 077 F	Printing control plate, page 584
44 0 325 C	Credit balance slider, page 578
44 0 605 N	Complete casing, page 584
44 1 713 W	Right internal side-plate, page 584
44 3 005 X	Aligning comb, page 580
44 3 018 T	Aligning comb arm, page 580
44 3 036 M	Aligning comb spacer, page 580
44 5 122 J	Servomechanism total key stay, page 578
43 4 062 N	« Automatic » and « repeat » key, page 576
52 1 240 G	Shaft, page 580
40 2 114 Q	Spring for 44 0 063 H, page 578
40 5 126 P	Spring, page 578
920 2 11 T	Cheese-head screw, page 580

....	**922 3 02 V**	Cheese-head set-screw, page 578
....	**938 4 05 V**	Nut, page 578
....	**940 2 87 C**	Washer, page 578
....	**940 5 33 S**	Washer, page 580

Connection between code number and symbol

00 0 182 Z	M2 E 28

40 1 045 V	N3 W 5
40 1 068 C	N3 W 127
40 2 072 Z	N3 B 72
40 2 114 Q	N3 I 11
40 2 115 R	N3 I 12
40 2 136 N	N3 N 12
40 2 145 X	N3 N 21
40 3 016 J	N3 D 16
40 3 021 P	N3 D 21
40 4 052 X	N3 G 51
40 4 076 X	N3 H 6
40 4 170 E	N3 R 20
40 5 035 P	N3 M 34
40 5 120 L	N3 M 120
40 5 121 J	N3 M 121
40 5 123 L	N3 M 123
40 5 126 P	N3 M 126
40 6 092 J	N3 Q 92
40 7 013 K	N3 F 13
40 7 041 X	N3 L 20
40 7 101 Z	N3 T 37
40 7 106 W	N3 T 42
40 7 108 G	N3 T 44
40 7 109 H	N3 T 45
40 7 110 V	N3 T 46
40 7 203 F	N3 U 33
40 7 204 G	N3 U 34
40 8 052 B	N3 V 52
40 8 054 D	N3 GV 54
40 8 106 F	N Z 6
40 8 139 F	N GZ 39
40 8 152 C	N V 45
40 8 231 B	N3 GZ 31

42 2 042 N	N4 B 42
42 4 040 S	N4 G 40
42 9 071 S	N4 Y 71

43 1 016 D	N5 A 16
43 1 017 E	N5 A 17
43 1 018 P	N5 AA 119 N
43 1 019 Q	N5 AA 119 K
43 1 022 B	N5 AA 22
43 1 030 P	N5 A 30
43 1 031 C	N5 GA 31
43 1 032 D	N5 A 32
43 1 035 G	N5 A 135
43 1 038 K	N5 EA 138
43 1 043 Q	N5 A 43
43 1 059 Y	N5 A 59
43 2 001 Q	N5 B 1
43 2 002 R	N5 B 2
43 2 003 J	N5 B 3
43 2 004 K	N5 B 4
43 2 005 L	N5 B 5
43 2 006 M	N5 B 6
43 2 007 N	N5 B 7
43 2 008 X	N5 B 8
43 2 009 Y	N5 B 9
43 2 010 L	N5 B 10
43 2 011 H	N5 B 11
43 2 012 A	N5 B 12
43 2 014 C	N5 B 14
43 2 015 D	N5 B 15
43 2 023 D	N5 B 23
43 2 024 E	N5 B 124
43 2 028 J	N5 GB 128
43 2 029 K	N5 GB 129
43 2 030 Q	N5 GB 130
43 2 031 D	N5 GB 31
43 2 032 E	N5 GB 32
43 2 033 F	N5 GB 33
43 2 034 G	N5 GB 34
43 2 035 H	N5 GB 35
43 2 036 A	N5 GB 36
43 2 037 B	N5 GB 37
43 2 038 L	N5 GB 38
43 2 039 M	N5 GB 39
43 2 064 N	N5 C 4
43 2 067 R	N5 C 7
43 2 069 T	N5 C 9
43 2 074 Q	N5 C 14
43 2 075 R	N5 EC 15
43 2 076 J	N5 C 16
43 2 082 H	N5 N 2
43 2 085 C	N5 N 5
43 2 086 D	N5 N 6
43 2 087 E	N5 N 7
43 2 096 F	N5 N 16
43 2 098 R	N5 EN 18
43 3 055 N	N5 E 13/2
43 4 002 K	N5 EG 1/2
43 4 005 N	N5 EG 2/S
43 4 013 D	N5 G 10
43 4 014 E	N5 G 11
43 4 016 G	N5 G 13
43 4 018 J	N5 G 15
43 4 030 J	N5 G 26
43 4 061 M	N5 G 54
43 4 062 N	N5 G 55
43 4 077 M	N5 H 7
43 4 109 T	N5 H 37
43 4 114 F	N5 H 42
43 4 121 E	N5 H 49
43 4 122 F	N5 H 50
43 4 137 E	N5 R 7
43 4 143 L	N5 R 13
43 4 144 M	N5 R 14
43 4 154 P	N5 R 24

43 4 161 N	N5 R 31
43 4 341 S	N5 EG 37
43 4 342 T	N5 G 38
43 4 450 U	N5 ER 120
43 4 698 Z	N5 EH 226
43 4 745 X	N5 GR 215
43 7 026 D	N5 L 6
43 7 030 M	N5 L 10/S
43 7 031 A	N5 L 10/D
43 7 032 B	N5 L 11
43 7 035 E	N5 L 14
43 7 038 R	N5 GL 17
43 7 044 P	N5 L 23
43 7 049 U	N5 EL 28
43 7 051 N	N5 L 30
43 7 054 R	N5 GL 33/1
43 7 055 J	N5 GL 33/2
43 7 059 W	N5 GL 36
43 7 060 T	N5 GL 37
43 7 062 R	N5 L 39
43 7 073 L	N5 T 3
43 7 327 P	N5 L 107
43 7 328 Y	N5 L 108
43 7 329 Z	N5 L 109
43 7 334 N	N5 L 113
43 7 340 G	N5 GL 119
43 7 636 M	N5 L 215
43 8 003 Y	N5 AZ 101
43 8 006 T	N5 AZ 1/6 Am.
43 8 012 Q	N5 EZ 5
43 8 014 J	N5 EZ 7
43 8 015 K	N5 EZ 8
43 8 016 L	N5 Z 9
43 8 017 M	N5 Z 10
43 8 019 X	N5 Z 12
43 8 022 J	N5 EZ 15
43 8 027 P	N5 Z 18
43 8 033 M	N5 AZ 13 AM
43 8 035 P	N5 GZ 25
43 8 042 W	N5 GZ 27
43 8 043 X	N5 Z 32
43 8 044 Y	N5 Z 33 CANADA'
43 8 052 Y	N5 CZ 22 AM
43 8 053 Z	N5 CZ 24 AM
43 8 060 C	N5 Z 40
43 8 074 W	N5 Z 102
43 8 079 B	N5 Z 123
43 8 083 Q	N5 Z 141
43 8 084 R	N5 Z 203 T.V.
43 8 085 J	N5 Z 203
43 8 087 L	N5 Z 220
43 8 102 Y	N6 Z 42
43 8 109 F	N5 CZ 101/6
43 8 112 R	N5 CZ 201
43 8 113 J	N5 CZ 222
43 8 114 K	N5 CZ 224
43 8 116 M	N5 CZ 22 AM Trop.
43 8 117 N	N5 CZ 24 AM Trop.
43 8 120 V	N5 AZ 13
43 8 128 Z	N5 CZ 222 Trop.
43 8 129 S	N5 CZ 224 Trop.
43 8 132 M	N5 Z 12 Finl.
43 8 137 J	N5 GZ 137 Finl.
43 8 145 S	N5 Z 55 Finl.
43 8 153 S	N5 CZ 222 PERU'
43 8 154 T	N5 CZ 224 PERU'
43 8 155 U	N5 AZ 1/6 AM Filtro
43 8 156 V	N5 AZ 101 Trop.
43 8 157 W	N5 AZ 501 Filtro Trop.
43 8 159 G	N5 AZ 1/6 AM Trop.
43 8 160 D	N5 AZ 101 Perù
43 8 303 H	N5 AZ 501 Filtro
43 8 306 C	N5 AZ 501 FINL. Filtro
43 8 323 U	N5 Z 116
43 8 325 W	N5 Z 117
43 8 330 F	N5 Z 121
43 8 348 M	N5 GZ 137
43 8 350 K	N5 Z 36
44 0 007 A	N6 A 27/S
44 0 008 K	—
44 0 011 V	N6 A 45/S
44 0 018 C	N6 D 37/S
44 0 019 D	N6 E 17/S
44 0 021 X	N6 GE 20/S
44 0 027 V	N6 G 124/S
44 0 031 Z	N6 GG 41/S
44 0 033 T	N6 GG 43/S
44 0 035 V	N6 GG 45/S
44 0 037 X	N6 GG 47/S
44 0 041 B	N6 H 13/S
44 0 045 F	N6 GH 41/S
44 0 049 K	N6 GM 77/S
44 0 051 D	N6 GM 79/S
44 0 054 G	N6 GM 84/S
44 0 055 H	N6 M 286/S
44 0 056 A	N6 GM 87/S
44 0 059 M	N6 GO 64/S
44 0 061 F	N6 GO 74/S
44 0 063 H	N6 O 81/S
44 0 065 B	N6 GQ 52/S
44 0 077 F	N6 T 115/S
44 0 114 Z	N6 AD 3/1 D
44 0 325 C	N6 EG 106/S
44 0 605 N	N6 AA 225/S
44 1 008 G	N6 A 8
44 1 009 H	N6 A 9
44 1 011 J	N6 A 11
44 1 014 M	N6 GA 14
44 1 027 J	N6 A 27
44 1 028 T	N6 A 28

44 1 041 Y	N6 A 41
44 1 061 U	N6 A 61
44 1 062 V	N6 A 62
44 1 076 T	N6 EA 76
44 1 077 U	N6 A 77
44 1 301 A	N6 A 101
44 1 302 B	N6 EA 102
44 1 307 G	N6 EA 107
44 1 324 Y	N6 A 124
44 1 603 H	N6 A 203
44 1 612 Z	N6 A 212
44 1 625 W	N6 AA 225
44 1 644 H	N6 EA 244
44 1 713 W	N6 AA 206/1
44 1 715 Y	N6 AA 206/2
44 2 019 T	N6 EB 19
44 2 021 M	N6 EB 21
44 2 038 W	N6 C 8
44 2 043 T	N6 C 13
44 2 050 E	N6 GC 20
44 2 052 U	N6 C 22
44 2 053 V	N6 C 23
44 2 054 W	N6 C 24
44 2 055 X	N6 C 25
44 2 058 A	N6 C 26
44 2 071 X	N6 N 11
44 2 073 Z	N6 EN 13
44 2 074 S	N6 N 14
44 2 077 V	N6 N 17
44 2 079 F	N6 EN 20
44 2 081 J	N6 N 21
44 2 082 K	N6 EN 22
44 2 085 N	N6 N 25
44 2 086 P	N6 N 26
44 2 316 Z	N6 B 216
44 2 320 H	N6 B 120
44 2 322 X	N6 B 122/0
44 2 334 T	—
44 2 351 C	N6 C 121
44 2 364 H	N6 EN 104
44 3 001 T	N6 D 1
44 3 002 U	N6 ED 202
44 3 005 X	N6 ED 5
44 3 008 A	N6 D 8
44 3 009 B	N6 D 9
44 3 012 M	N6 D 12
44 3 013 N	N6 D 13
44 3 014 P	N6 D 114
44 3 016 R	N6 ED 16
44 3 017 J	N6 ED 17
44 3 018 T	N6 ED 18
44 3 022 P	N6 D 22
44 3 023 Q	N6 ED 223
44 3 025 J	N6 D 25
44 3 033 J	N6 D 33
44 3 036 M	N6 D 36
44 3 047 Y	N6 AD 3/1
44 3 049 A	N6 AD 26
44 3 051 U	N6 E 1
44 3 061 W	N6 E 10
44 3 063 Y	N6 EE 12
44 3 065 S	N6 E 14
44 3 067 U	N6 E 16
44 3 068 D	N6 E 17
44 3 071 Y	N6 GE 20
44 3 073 S	N6 E 22
44 3 084 N	N6 E 24
44 3 311 V	N6 D 111
44 3 355 H	N6 E 105
44 3 360 J	N6 E 109
44 3 374 C	N6 AE 101
44 3 386 Z	N6 E 126
44 3 387 S	N6 E 127
44 4 001 U	N6 EG 1/4
44 4 002 V	N6 EG 1/5
44 4 003 W	N6 EG 1/6
44 4 004 X	N6 EG 1/9
44 4 006 Z	N6 EG 1/11
44 4 007 S	N6 EG 1/12
44 4 008 B	N6 EG 2/1
44 4 012 N	N6 G 5
44 4 014 Q	N6 G 7
44 4 015 R	N6 G 8
44 4 016 J	N6 G 9
44 4 019 V	N6 EG 112
44 4 021 P	N6 EG 14
44 4 028 W	N6 G 21
44 4 029 X	N6 EG 22
44 4 032 J	N6 G 25
44 4 037 P	N6 G 30
44 4 038 Y	N6 EG 31
44 4 042 U	N6 EG 35
44 4 043 V	N6 G 36
44 4 047 Z	N6 EG 40
44 4 058 C	N6 GG 51
44 4 062 Y	N6 G 55
44 4 072 S	N6 G 65
44 4 076 W	N6 GG 68
44 4 077 X	N6 GG 69
44 4 078 G	N6 GG 70
44 4 079 H	N6 GG 71
44 4 084 P	N6 H 4
44 4 088 T	N6 EH 8
44 4 091 N	N6 GH 11
44 4 094 R	N6 H 14
44 4 095 J	N6 H 15
44 4 098 V	N6 GH 18
44 4 099 W	N6 H 19
44 4 100 G	N6 H 20
44 4 101 V	N6 H 21
44 4 102 W	N6 GH 22

44 4 103 X	N6 H 23
44 4 104 Y	N6 H 24
44 4 105 Z	N6 EH 25
44 4 109 D	N6 H 29
44 4 111 N	N6 H 131
44 4 112 P	N6 H 32
44 4 113 Q	N6 H 33
44 4 114 R	N6 H 34
44 4 115 J	N6 H 35
44 4 118 V	N6 H 138
44 4 121 Q	N6 GH 41
44 4 127 N	N6 H 47
44 4 131 J	N6 H 51
44 4 137 Q	N6 H 57
44 4 148 B	N6 H 64
44 4 165 U	N6 R 5
44 4 166 V	N6 R 6
44 4 168 F	N6 R 8
44 4 170 D	N6 ER 10
44 4 172 T	N6 R 12
44 4 178 H	N6 R 18
44 4 186 J	N6 R 26
44 4 188 U	N6 R 28
44 4 189 V	N6 R 29
44 4 305 H	N6 EG 101/10
44 4 313 Y	N6 G 106
44 4 324 T	N6 G 117
44 4 325 U	N6 EG 118
44 4 327 W	N6 EG 120
44 4 334 V	N6 GG 127
44 4 346 H	N6 G 139
44 4 348 K	N6 GG 141
44 4 350 R	N6 GG 143
44 4 352 F	N6 GG 145
44 4 354 H	N6 GG 147
44 4 361 G	N6 GR 101
44 4 363 A	N6 G 256
44 4 365 C	N6 EG 158
44 4 382 W	N6 AH 102
44 4 396 U	N6 H 116
44 4 407 Y	N6 H 127
44 4 416 Q	N6 EH 236
44 4 419 T	N6 H 139
44 4 425 R	N6 GH 145
44 4 428 U	N6 H 148
44 4 438 W	N6 H 158
44 4 440 C	N6 AH 160
44 4 463 X	N6 ER 103
44 4 464 Y	N6 GR 104
44 4 477 V	N6 ER 117
44 4 479 F	N6 R 119
44 4 689 A	N6 EH 209
44 4 692 V	N6 EH 212
44 5 010 Z	N6 M 10
44 5 011 N	N6 M 11
44 5 012 P	N6 M 12
44 5 013 Q	N6 M 13
44 5 014 R	N6 M 14
44 5 019 W	N6 M 19
44 5 020 T	N6 M 20
44 5 021 Q	N6 M 21
44 5 022 R	N6 M 22
44 5 029 Y	N6 GM 29
44 5 030 V	N6 GM 30
44 5 032 K	N6 M 32
44 5 033 L	N6 EM 33
44 5 034 M	N6 GM 34
44 5 036 P	N6 M 36
44 5 037 Q	N6 M 37
44 5 038 Z	N6 EM 38
44 5 039 S	N6 EM 39
44 5 041 U	N6 EM 41
44 5 044 X	N6 M 44
44 5 047 S	N6 GM 47
44 5 048 B	N6 GM 48
44 5 049 C	N6 M 49
44 5 051 W	N6 EM 51
44 5 052 X	N6 EM 52
44 5 053 Y	N6 M 53
44 5 054 Z	N6 EM 54
44 5 055 S	N6 M 55
44 5 056 T	N6 M 56
44 5 057 U	N6 M 57
44 5 058 D	N6 M 58
44 5 060 B	N6 GM 60
44 5 062 Z	N6 EM 62
44 5 063 S	N6 EM 63
44 5 066 V	N6 M 66
44 5 067 W	N6 M 67
44 5 068 F	N6 M 268
44 5 072 T	N6 M 72
44 5 075 W	N6 M 75
44 5 077 Y	N6 GM 77
44 5 079 A	N6 GM 79
44 5 080 Y	N6 GM 80
44 5 083 P	N6 EM 83
44 5 084 Q	N6 GM 84
44 5 085 R	N6 EM 85
44 5 087 K	N6 GM 87
44 5 090 S	N6 M 90
44 5 091 P	N6 M 291
44 5 092 Q	N6 EM 92
44 5 093 R	N6 GM 93
44 5 099 X	N6 EM 99
44 5 100 H	N6 M 100
44 5 113 R	N6 AO 3
44 5 114 J	N6 O 4
44 5 120 U	N6 EO 10
44 5 122 J	N6 O 112
44 5 123 K	N6 O 113
44 5 127 P	N6 GO 17

44 5 128 Y	N6 O 18
44 5 130 W	N6 O 20
44 5 131 K	N6 GO 121
44 5 132 L	N6 O 22
44 5 133 M	N6 EO 23
44 5 135 P	N6 EO 125
44 5 136 Q	N6 EO 26
44 5 139 T	N6 O 29
44 5 140 G	N6 EO 30
44 5 142 W	N6 EO 32
44 5 143 X	N6 GO 33
44 5 147 T	N6 EO 37
44 5 148 C	N6 EO 38
44 5 149 D	N6 O 39
44 5 150 A	N6 O 40
44 5 151 X	N6 EO 41
44 5 152 Y	N6 EO 42
44 5 154 S	N6 EO 44
44 5 157 V	N6 GO 47
44 5 158 E	N6 O 48
44 5 159 F	N6 GO 49
44 5 160 C	N6 EO 50
44 5 162 S	N6 O 52
44 5 163 T	N6 O 53
44 5 164 U	N6 O 54
44 5 165 V	N6 O 55
44 5 169 H	N6 O 59
44 5 170 E	N6 O 60
44 5 172 U	N6 O 62
44 5 174 W	N6 GO 64
44 5 178 A	N6 O 67
44 5 180 Z	N6 O 68
44 5 181 N	N6 GO 69
44 5 185 J	N6 O 72
44 5 186 K	N6 O 73
44 5 190 T	N6 GO 77
44 5 194 K	N6 O 81
44 5 311 X	N6 AO 101
44 5 342 E	N6 GM 242
44 5 359 P	N6 AM 259
44 5 365 D	N6 EM 265
44 5 369 R	N6 M 269
44 5 370 N	N6 EM 270
44 5 371 B	N6 M 471
44 5 381 W	N6 M 281
44 5 386 T	N6 M 486
44 5 398 F	N6 M 298
44 5 417 J	N6 EO 107
44 5 418 T	N6 O 108
44 5 419 U	N6 EO 209
44 5 421 N	N6 O 211
44 5 435 L	N6 EM 245
44 5 437 N	N6 GO 127
44 5 441 S	N6 O 131
44 5 518 X	N6 AM 204
44 5 619 C	N6 AM 417
44 6 001 W	N6 Q 1
44 6 002 X	N6 Q 2
44 6 003 Y	N6 Q 3
44 6 004 Z	N6 EQ 4
44 6 005 S	N6 GQ 5
44 6 006 T	N6 GQ 6
44 6 007 U	N6 EQ 7
44 6 008 D	N6 EQ 8
44 6 009 E	N6 Q 9
44 6 010 S	N6 Q 10
44 6 011 P	N6 EQ 11
44 6 013 R	N6 Q 13
44 6 014 J	N6 EQ 14
44 6 015 K	N6 EQ 15
44 6 016 L	N6 Q 16
44 6 017 M	N6 EQ 17
44 6 018 W	N6 GQ 18
44 6 021 R	N6 EQ 21
44 6 022 J	N6 EQ 22
44 6 023 K	N6 Q 23
44 6 026 N	N6 Q 26
44 6 029 Z	N6 EQ 29
44 6 030 W	N6 Q 30
44 6 033 M	N6 GQ 33
44 6 035 P	N6 Q 35
44 6 036 Q	N6 Q 36
44 6 037 R	N6 EQ 37
44 6 038 S	N6 EQ 38
44 6 040 G	N6 Q 40
44 6 043 X	N6 Q 43
44 6 044 Y	N6 Q 44
44 6 045 Z	N6 Q 45
44 6 048 C	N6 EQ 48
44 6 049 D	N6 Q 49
44 6 050 A	N6 GQ 50
44 6 052 Y	N6 GQ 52
44 6 053 Z	N6 Q 53
44 6 054 S	N6 Q 54
44 6 055 T	N6 Q 55
44 6 056 U	N6 GQ 56
44 6 058 E	N6 Q 58
44 6 059 F	N6 Q 59
44 6 060 C	N6 Q 60
44 6 062 S	N6 Q 62
44 6 065 V	N6 Q 65
44 6 075 X	N6 O 15
44 6 078 A	N6 GO 74
44 6 080 Z	N6 O 79
44 6 334 X	N6 EQ 134
44 6 347 C	N6 EQ 147
44 7 005 T	N6 EF 5
44 7 006 U	N6 F 6
44 7 007 V	N6 F 7
44 7 008 E	N6 F 8
44 7 009 F	N6 F 9

44 7 023 L	N6 EL 3
44 7 024 M	N6 L 4
44 7 025 N	N6 L 5
44 7 036 R	N6 L 16
44 7 045 S	N6 L 25
44 7 046 T	N6 EL 26/0
44 7 048 E	N6 L 48
44 7 049 F	N6 L 49
44 7 052 Z	N6 L 32
44 7 055 U	N6 L 35
44 7 060 D	N6 EL 40
44 7 062 T	N6 L 42
44 7 063 U	N6 L 43
44 7 073 W	N6 T 104
44 7 076 Z	N6 T 105
44 7 089 X	N6 T 16
44 7 090 U	N6 AT 17
44 7 093 K	N6 ET 19
44 7 094 L	N6 ET 220
44 7 095 M	N6 ET 21
44 7 096 N	N6 T 22
44 7 097 P	N6 T 23
44 7 099 Z	N6 T 25
44 7 102 Z	N6 T 28
44 7 103 S	N6 ET 220/0
44 7 105 U	N6 ET 132/Tetr.
44 7 120 W	N6 T 30
44 7 121 K	N6 T 31
44 7 125 P	N6 T 35
44 7 126 Q	N6 ET 36
44 7 127 R	N6 T 37
44 7 128 S	N6 T 38
44 7 129 T	N6 T 39
44 7 130 Y	N6 T 40
44 7 134 Q	N6 T 44
44 7 135 R	N6 T 45
44 7 319 H	N6 EL 101
44 7 320 E	N6 EL 102
44 7 332 W	N6 L 112
44 7 380 B	N6 ET 108
44 7 387 W	N6 T 115/0
44 7 391 S	N6 ET 118/0
44 7 671 A	N6 T 201
44 7 672 B	N6 T 202
44 7 683 X	N6 ET 212
44 7 684 Y	N6 ET 213/S
44 7 685 Z	N6 ET 213/D
44 7 981 J	N6 ET 510
44 7 982 K	N6 ET 411
44 8 002 H	N6 Z 2
44 8 005 C	N6 GZ 5
44 8 006 D	N6 Z 6
44 8 015 V	N6 EZ 15
44 8 022 U	N6 Z 22
44 8 041 F	N6 Z 41
44 8 048 N	N6 Z 48
44 8 060 N	N6 Z 60
44 8 061 B	N6 Z 61
44 8 062 C	N6 Z 62
44 8 063 D	N6 Z 63
44 8 064 E	N6 Z 64
44 8 065 F	N6 Z 65
44 8 072 E	N6 EZ 72
44 8 074 G	N6 Z 74
44 8 075 H	N6 Z 75
44 8 076 A	N6 BZ 69
44 8 079 M	N6 Z 79 AM
44 8 083 S	N6 BZ 69 AM
47 1 033 N	N7 A 33
47 1 034 P	N7 A 34
47 3 019 S	N7 D 19
50 4 088 Y	NK P 88
50 4 089 Z	NK P 91
50 6 007 Z	NK R 7
52 1 051 J	N5 EG 18/C
52 1 091 B	N5 T 14/C
52 1 194 F	—
52 1 196 H	—
52 1 240 G	—
52 1 255 T	—
52 1 901 L	—
52 2 027 B	N5 EI 27
52 2 064 Q	N5 I 64
52 6 020 L	—
52 6 029 R	—
52 6 034 E	—
52 6 059 X	—
52 6 107 M	—
52 6 108 W	—
52 6 109 X	—
52 6 110 K	—
52 6 111 G	—
52 6 114 B	—
52 6 115 C	—
52 6 118 P	—
52 6 121 A	—
52 6 122 B	—
52 6 123 C	—
52 6 413 F	—
68 0 202 K	N5 20/2
68 0 207 Q	—
68 0 303 Q	N5 30/3
68 0 304 R	N5 30/4
68 0 310 J	N6 30/1
68 0 312 G	N6 30/3
68 0 313 H	N6 30/4
68 0 314 A	N6 30/5

68 0 320 L	—
68 0 324 C	—
68 0 326 E	—
68 0 328 Q	—
68 0 401 B	N5 40/1
68 0 402 C	N5 40/2
68 0 403 D	N5 40/3
68 0 404 E	N5 40/4
68 0 406 G	N5 40/9
68 0 409 K	N6 40/1
68 0 410 F	N6 40/2
68 0 411 U	N6 40/3
68 0 412 V	N6 40/4
68 0 415 Y	N6 40/6
68 0 417 S	N6 40/7
68 0 422 X	N6 40/9
68 0 502 G	N5 50/2
68 0 503 H	N6 50/1
68 0 504 A	N6 50/2
68 0 510 B	—
68 0 602 L	N6 60/1
68 0 604 N	N6 60/3
68 0 605 P	N3 P 97
68 0 706 L	N7 70/1
68 0 802 D	N6 80/1
68 0 803 E	N6 80/2
68 1 104 W	—
68 1 201 F	N5 25/1
68 1 206 C	N6 25/3
68 1 215 U	—
68 1 218 F	—
920 2 11 T	120261
920 2 12 U	120262
920 2 15 X	120265
920 2 16 Y	120266
920 3 01 E	120301

920 3 02 F	120302
920 3 03 G	120303
920 3 05 A	120305
920 3 07 C	120307
920 3 14 S	1203014
920 3 51 F	120351
920 3 52 G	120352
920 3 53 H	120353
920 3 54 A	120354
920 3 56 C	120356
920 3 57 D	120357
920 3 60 L	1203510
920 4 02 U	120402
920 4 04 W	120404
922 3 01 U	122301
922 3 02 V	122302
922 3 51 V	122351
922 3 52 W	122352
923 3 02 W	123302
924 4 06 Q	124406
925 2 12 M	125262
925 2 20 Z	1252610
925 2 25 J	1252615
925 3 04 S	125304
925 3 06 U	125306
925 3 10 T	1253010
925 3 12 R	1253012
925 3 22 K	1253022
925 3 27 Q	1253027
925 3 36 R	1253036
925 3 51 Y	125351
925 3 57 W	125357
925 5 01 Q	125501

926 2 16 J	126266
926 3 01 Y	126301
926 3 17 P	1263017
926 3 33 P	1263033
926 3 54 U	126354
926 3 84 K	1263538
926 3 90 V	1263544
926 3 91 J	1263545
936 3 02 T	136302
938 2 11 Z	138261
938 3 05 G	138305
938 3 07 A	138307
938 3 51 D	138351
938 4 05 V	138405
938 5 05 Z	138505
938 5 06 S	138506
938 7 01 D	138701
940 2 50 S	40265
940 2 51 P	40267
940 3 02 K	40303
940 3 03 L	40304
940 3 14 E	40312
940 3 38 N	403311
940 3 39 P	403312/0,2
940 3 40 U	403312/0,5
940 3 48 Y	40352
940 3 60 Y	40364
940 3 62 N	40366
940 3 66 J	403611
940 3 75 K	403620
940 4 04 A	40405
940 4 61 A	40461
940 5 04 E	40506
940 5 19 C	40514

940 5 20 H	40515
940 5 35 S	40521
940 5 45 E	40532
942 4 32 K	142462
942 5 27 J	142517
943 1 21 L	43151
944 4 21 J	44421
944 5 41 S	44541
945 1 61 W	45181
945 2 21 S	45221
945 2 30 F	—
945 2 51 G	45281
945 3 20 H	—
945 3 41 A	45361
999 0 17 Q	120502 E
999 1 67 T	1263522 E

Connection between symbol and code number

M2 E 28	00 0 182 Z
N V 45	40 8 152 C
N Z 6	40 8 106 F
N GZ 39	40 8 139 F
NK P 88	50 4 088 Y
NK P 91	50 4 089 Z
NK R 7	50 6 007 Z
N3 B 72	40 2 072 Z
N3 D 16	40 3 016 J
N3 D 21	40 3 021 P
N3 F 13	40 7 013 K
N3 G 51	40 4 052 X
N3 H 6	40 4 076 X
N3 I 11	40 2 114 Q
N3 I 12	40 2 115 R
N3 L 20	40 7 041 X
N3 M 34	40 5 035 P
N3 M 120	40 5 120 L
N3 M 121	40 5 121 J
N3 M 123	40 5 123 L
N3 M 126	40 5 126 P
N3 N 12	40 2 136 N
N3 N 21	40 2 145 X
N3 P 97	68 0 605 P
N3 Q 92	40 6 092 J
N3 R 20	40 4 170 E
N3 T 37	40 7 111 Z
N3 T 42	40 7 106 W
N3 T 44	40 7 108 G
N3 T 45	40 7 109 H
N3 T 46	40 7 110 V
N3 U 33	40 7 203 F
N3 U 34	40 7 204 G
N3 V 52	40 8 052 B
N3 GV 54	40 8 054 D
N3 W 5	40 1 045 V
N3 W 127	40 1 068 C
N3 GZ 31	40 8 231 B
N4 B 42	42 2 042 N
N4 G 40	42 4 040 S
N4 Y 71	42 9 071 S
N5 A 16	43 1 016 D
N5 A 17	43 1 017 E
N5 AA 22	43 1 022 B
N5 A 30	43 1 030 P
N5 GA 31	43 1 031 C
N5 A 32	43 1 032 D
N5 A 43	43 1 043 Q
N5 A 59	43 1 059 Y
N5 AA 119/K	43 1 019 Q
N5 AA 119/N	43 1 018 P
N5 A 135	43 1 035 G
N5 EA 138	43 1 038 K
N5 B 1	43 2 001 Q
N5 B 2	43 2 002 R
N5 B 3	43 2 003 J
N5 B 4	43 2 004 K
N5 B 5	43 2 005 L
N5 B 6	43 2 006 M
N5 B 7	43 2 007 N
N5 B 8	43 2 008 X
N5 B 9	43 2 009 Y
N5 B10	43 2 010 L
N5 B 11	43 2 011 H
N5 B 12	43 2 012 A
N5 B 14	43 2 014 C
N5 B 15	43 2 015 D
N5 B 23	43 2 023 D
N5 GB 31	43 2 031 D
N5 GB 32	43 2 032 E
N5 GB 33	43 2 033 F
N5 GB 34	43 2 034 G
N5 GB 35	43 2 035 H
N5 GB 36	43 2 036 A
N5 GB 37	43 2 037 B
N5 GB 38	43 2 038 L
N5 GB 39	43 2 039 M
N5 B 124	43 2 024 E
N5 GB 128	43 2 028 J
N5 GB 129	43 2 029 K
N5 GB 130	43 2 030 Q
N5 C 4	43 2 064 N
N5 C 7	43 2 067 R
N5 C 9	43 2 069 T
N5 C 14	43 2 074 Q
N5 EC 15	43 2 075 R
N5 C 16	43 2 076 J
N5 E 13/2	43 3 055 N
N5 EG 1/2	43 4 002 K
N5 EG 2/S	43 4 005 N
N5 G 10	43 4 013 D
N5 G 11	43 4 014 E
N5 G 13	43 4 016 G
N5 G 15	43 4 018 J
N5 EG 18/C	52 1 051 J
N5 G 26	43 4 030 J
N5 EG 37	43 4 341 S
N5 G 38	43 4 342 T
N5 G 54	43 4 061 M
N5 G 55	43 4 062 N
N5 H 7	43 4 077 M
N5 H 37	43 4 109 T
N5 H 42	43 4 114 F
N5 H 49	43 4 121 E
N5 H 50	43 4 122 F
N5 EH 226	43 4 698 Z

N5 EI 27	52 2 027 B	N5 AZ 1/6 AM	43 8 006 T	N5 CZ 201	43 8 112 R
N5 I 64	52 2 064 Q	N5 AZ 1/6 AM Filtro	43 8 155 U	N5 Z 203	43 8 085 J
N5 L 6	43 7 026 D	N5 AZ 1/6 AM Trop.	43 8 159 G	N5 Z 203 T.V.	43 8 084 R
N5 L 10/D	43 7 031 A	N5 EZ 5	43 8 012 Q	N5 Z 220	43 8 087 L
N5 L 10/S	43 7 030 M	N5 EZ 7	43 8 014 J	N5 CZ 222	43 8 113 J
N5 L 11	43 7 032 B	N5 EZ 8	43 8 015 K	N5 CZ 222 PERU'	43 8 153 S
N5 L 14	43 7 035 E	N5 Z 9	43 8 016 L	N5 CZ 222 Trop.	43 8 128 Z
N5 GL 17	43 7 038 R	N5 Z 10	43 8 017 M	N5 CZ 224	43 8 114 K
N5 L 23	43 7 044 P	N5 Z 12	43 8 019 X	N5 CZ 224 PERU'	43 8 154 T
N5 EL 28	43 7 049 U	N5 Z 12 FINL.	43 8 132 M	N5 CZ 224 Trop.	43 8 129 S
N5 L 30	43 7 051 N	N5 AZ 13	43 8 120 V	N5 AZ 501 Filtro	43 8 303 H
N5 GL 33/1	43 7 054 R	N5 AZ 13 AM.	43 8 033 M	N5 AZ 501 Filtro Trop.	43 8 157 W
N5 GL 33/2	43 7 055 J	N5 EZ 15	43 8 022 J	N5 AZ 501 FINL. Filtro	43 8 306 C
N5 GL 36	43 7 059 W	N5 Z 18	43 8 027 P	N5 20/2	68 0 202 K
N5 GL 37	43 7 060 T	N5 CZ 22 AM.	43 8 052 Y	N5 25/1	68 1 201 F
N5 L 39	43 7 062 R	N5 CZ 22 AM Trop.	43 8 116 M	N5 30/3	68 0 303 Q
N5 L 107	43 7 327 P	N5 CZ 24 AM.	43 8 053 Z	N5 30/4	68 0 304 R
N5 L 108	43 7 328 Y	N5 CZ 24 AM Trop.	43 8 117 N	N5 40/1	68 0 401 B
N5 L 109	43 7 329 Z	N5 GZ 25	43 8 035 P	N5 40/2	68 0 402 C
N5 L 113	43 7 334 N	N5 GZ 27	43 8 042 W	N5 40/3	68 0 403 D
N5 GL 119	43 7 340 G	N5 Z 32	43 8 043 X	N5 40/4	68 0 404 E
N5 L 215	43 7 636 M	N5 Z 33 CANADA'	43 8 044 Y	N5 40/9	68 0 406 G
N5 N 2	43 2 082 H	N5 Z 36	43 8 350 K	N5 50/2	68 0 502 G
N5 N 5	43 2 085 C	N5 Z 40	43 8 060 C		
N5 N 6	43 2 086 D	N5 Z 55 FINL.	43 8 145 S	N6 A 8	44 1 008 G
N5 N 7	43 2 087 E	N5 AZ 101	43 8 003 Y	N6 A 9	44 1 009 H
N5 N 16	43 2 096 F	N5 CZ 101/6	43 8 109 F	N6 A 11	44 1 011 J
N5 EN 18	43 2 098 R	N5 AZ 101 PERU'	43 8 160 D	N6 GA 14	44 1 014 M
N5 R 7	43 4 137 E	N5 AZ 101 Trop.	43 8 156 V	N6 A 27	44 1 027 J
N5 R 13	43 4 143 L	N5 Z 102	43 8 074 W	N6 A 27/S	44 0 007 A
N5 R 14	43 4 144 M	N5 Z 116	43 8 323 U	N6 A 28	44 1 028 T
N5 R 24	43 4 154 P	N5 Z 117	43 8 325 W	N6 A 41	44 1 041 Y
N5 R 31	43 4 161 N	N5 Z 121	43 8 330 F	N6 A 45/S	44 0 011 V
N5 ER 120	43 4 450 U	N5 Z 123	43 8 079 B	N6 A 61	44 1 061 U
N5 GR 215	43 4 745 X	N5 GZ 137	43 8 348 M	N6 A 62	44 1 062 V
N5 T 3	43 7 073 L	N5 GZ 137 FINL.	43 8 137 J	N6 EA 76	44 1 076 T
N5 T 14/C	52 1 091 B	N5 Z 141	43 8 083 Q	N6 A 77	44 1 077 U

N6 A 101	44 1 301 A	N6 D 25	44 3 025 J	N6 G 5	44 4 012 N
N6 EA 102	44 1 302 B	N6 AD 26	44 3 049 A	N6 G 7	44 4 014 Q
N6 EA 107	44 1 307 G	N6 D 33	44 3 033 J	N6 G 8	44 4 015 R
N6 A 124	44 1 324 Y	N6 D 36	44 3 036 M	N6 G 9	44 4 016 J
N6 A 203	44 1 603 H	N6 D 37/S	44 0 018 C	N6 EG 14	44 4 021 P
N6 AA 206/1	44 1 713 W	N6 D 111	44 3 311 V	N6 G 21	44 4 028 W
N6 AA 206/2	44 1 715 Y	N6 D 114	44 3 014 P	N6 EG 22	44 4 029 X
N6 A 212	44 1 612 Z	N6 ED 202	44 3 002 U	N6 G 25	44 4 032 J
N6 AA 225	44 1 625 W	N6 ED 223	44 3 023 Q	N6 G 30	44 4 037 P
N6 AA 225/S	44 0 605 N	N6 E 1	44 3 051 U	N6 EG 31	44 4 038 Y
N6 EA 244	44 1 644 H	N6 E 10	44 3 061 W	N6 EG 35	44 4 042 U
N6 EB 19	44 2 019 T	N6 EE 12	44 3 063 Y	N6 G 36	44 4 043 V
N6 EB 21	44 2 021 M	N6 E 14	44 3 065 S	N6 EG 40	44 4 047 Z
N6 B 120	44 2 320 H	N6 E 16	44 3 067 U	N6 GG 41/S	44 0 031 Z
N6 B 122/0	44 2 322 X	N6 E 17	44 3 068 D	N6 GG 43/S	44 0 033 T
N6 B 216	44 2 316 Z	N6 E 17/S	44 0 019 D	N6 GG 45/S	44 0 035 V
N6 C 8	44 2 038 W	N6 GE 20	44 3 071 Y	N6 GG 47/S	44 0 037 X
N6 C 13	44 2 043 T	N6 GE 20/S	44 0 021 X	N6 GG 51	44 4 058 C
N6 GC 20	44 2 050 E	N6 E 22	44 3 073 S	N6 G 55	44 4 062 Y
N6 C 22	44 2 052 U	N6 E 24	44 3 084 N	N6 G 65	44 4 072 S
N6 C 23	44 2 053 V	N6 AE 101	44 3 374 C	N6 GG 68	44 4 076 W
N6 C 24	44 2 054 W	N6 E 105	44 3 355 H	N6 GG 69	44 4 077 X
N6 C 25	44 2 055 X	N6 E 109	44 3 360 J	N6 GG 70	44 4 078 G
N6 C 26	44 2 058 A	N6 E 126	44 3 386 Z	N6 GG 71	44 4 079 H
N6 C 121	44 2 351 C	N6 E 127	44 3 387 S	N6 EG 101/10	44 4 305 H
N6 D 1	44 3 001 T	N6 EF 5	44 7 005 T	N6 G 106	44 4 313 Y
N6 AD 3/1	44 3 047 Y	N6 F 6	44 7 006 U	N6 EG 106/S	44 0 325 C
N6 AD 3/1 D	44 0 114 Z	N6 F 7	44 7 007 V	N6 EG 112	44 4 019 V
N6 ED 5	44 3 005 X	N6 F 8	44 7 008 E	N6 G 117	44 4 324 T
N6 D 8	44 3 008 A	N6 F 9	44 7 009 F	N6 EG 118	44 4 325 U
N6 D 9	44 3 009 B	N6 EG 1/4	44 4 001 U	N6 EG 120	44 4 327 W
N6 D 12	44 3 012 M	N6 EG 1/5	44 4 002 V	N6 G 124/S	44 0 027 V
N6 D 13	44 3 013 N	N6 EG 1/6	44 4 003 W	N6 GG 127	44 4 334 V
N6 ED 16	44 3 016 R	N6 EG 1/9	44 4 004 X	N6 G 139	44 4 346 H
N6 ED 17	44 3 017 J	N6 EG 1/11	44 4 006 Z	N6 GG 141	44 4 348 K
N6 ED 18	44 3 018 T	N6 EG 1/12	44 4 007 S	N6 GG 143	44 4 350 R
N6 D 22	44 3 022 P	N6 EG 2/1	44 4 008 B	N6 GG 145	44 4 352 F

N6 GG 147	44 4 354 H	N6 AH 160	44 4 440 C	N6 EM 39	44 5 039 S
N6-EG 158	44 4 365 C	N6 EH 209	44 4 689 A	N6-EM 41	44 5 041 U
N6 G 256	44 4 363 A	N6 EH 212	44 4 692 V	N6 M 44	44 5 044 X
N6 H 4	44 4 084 P	N6 EH 236	44 4 416 Q	N6 GM 47	44 5 047 S
N6 EH 8	44 4 088 T	N6 EL 3	44 7 023 L	N6 GM 48	44 5 048 B
N6 GH 11	44 4 091 N	N6 L 4	44 7 024 M	N6 M 49	44 5 049 C
N6 H 13/S	44 0 041 B	N6 L 5	44 7 025 N	N6 EM 51	44 5 051 W
N6 H 14	44 4 094 R	N6 L 16	44 7 036 R	N6 EM 52	44 5 052 X
N6 H 15	44 4 095 J	N6 L 25	44 7 045 S	N6 M 53	44 5 053 Y
N6 GH 18	44 4 098 V	N6 EL 26/0	44 7 046 T	N6 EM 54	44 5 054 Z
N6 H 19	44 4 099 W	N6 L 32	44 7 052 Z	N6 M 55	44 5 055 S
N6 H 20	44 4 100 G	N6 L 35	44 7 055 U	N6 M 56	44 5 056 T
N6 H 21	44 4 101 V	N6 EL 40	44 7 060 D	N6 M 57	44 5 057 U
N6 GH 22	44 4 102 W	N6 L 42	44 7 062 T	N6 M 58	44 5 058 D
N6 H 23	44 4 103 X	N6 L 43	44 7 063 U	N6 GM 60	44 5 060 B
N6 H 24	44 4 104 Y	N6 L 48	44 7 048 E	N6 EM 62	44 5 062 Z
N6 EH 25	44 4 105 Z	N6 L 49	44 7 049 F	N6 EM 63	44 5 063 S
N6 H 29	44 4 109 D	N6 EL 101	44 7 319 H	N6 M 66	44 5 066 V
N6 H 32	44 4 112 P	N6 EL 102	44 7 320 E	N6 M 67	44 5 067 W
N6 H 33	44 4 113 Q	N6 L 112	44 7 332 W	N6 M 72	44 5 072 T
N6 H 34	44 4 114 R	N6 M 10	44 5 010 Z	N6 M 75	44 5 075 W
N6 H 35	44 4 115 J	N6 M 11	44 5 011 N	N6 GM 77	44 5 077 Y
N6 GH 41	44 4 121 Q	N6 M 12	44 5 012 P	N6 GM 77/S	44 0 049 K
N6 GH 41/S	44 0 045 F	N6 M 13	44 5 013 Q	N6 GM 79	44 5 079 A
N6 H 47	44 4 127 N	N6 M 14	44 5 014 R	N6 GM 79/S	44 0 051 D
N6 H 51	44 4 131 J	N6 M 19	44 5 019 W	N6 GM 80	44 5 080 Y
N6 H 57	44 4 137 Q	N6 M 20	44 5 020 T	N6 EM 83	44 5 083 P
N6 H 64	44 4 148 B	N6 M 21	44 5 021 Q	N6 GM 84	44 5 084 Q
N6 AH 102	44 4 382 W	N6 M 22	44 5 022 R	N6 GM 84/S	44 0 054 G
N6 H 116	44 4 396 U	N6 GM 29	44 5 029 Y	N6 EM 85	44 5 085 R
N6 H 127	44 4 407 Y	N6 GM 30	44 5 030 V	N6 GM 87	44 5 087 K
N6 H 131	44 4 111 N	N6 M 32	44 5 032 K	N6 GM 87/S	44 0 056 A
N6 H 138	44 4 118 V	N6 EM 33	44 5 033 L	N6 M 90	44 5 090 S
N6 H 139	44 4 419 T	N6 GM 34	44 5 034 M	N6 EM 92	44 5 092 Q
N6 GH 145	44 4 425 R	N6 M 36	44 5 036 P	N6 GM 93	44 5 093 R
N6 H 148	44 4 428 U	N6 M 37	44 5 037 Q	N6 EM 99	44 5 099 X
N6 H 158	44 4 438 W	N6 EM 38	44 5 038 Z	N6 M 100	44 5 100 H

N6 AM 204	44 5 518 X
N6 GM 242	44 5 342 E
N6 EM 245	44 5 435 L
N6 AM 259	44 5 359 P
N6 EM 265	44 5 365 D
N6 M 268	44 5 068 F
N6 M 269	44 5 369 R
N6 EM 270	44 5 370 N
N6 M 281	44 5 381 W
N6 M 286/S	44 0 055 H
N6 M 291	44 5 091 P
N6 M 298	44 5 398 F
N6 AM 417	44 5 619 C
N6 M 471	44 5 371 B
N6 M 486	44 5 386 T
N6 N 11	44 2 071 X
N6 EN 13	44 2 073 Z
N6 N 14	44 2 074 S
N6 N 17	44 2 077 V
N6 EN 20	44 2 079 F
N6 N 21	44 2 081 J
N6 EN 22	44 2 082 K
N6 N 25	44 2 085 N
N6 N 26	44 2 086 P
N6 EN 104	44 2 364 H
N6 AO 3	44 5 113 R
N6 O 4	44 5 114 J
N6 EO 10	44 5 120 U
N6 O 15	44 6 075 X
N6 GO 17	44 5 127 P
N6 O 18	44 5 128 Y
N6 O 20	44 5 130 W
N6 O 22	44 5 132 L
N6 EO 23	44 5 133 M
N6 EO 26	44 5 136 Q
N6 O 29	44 5 139 T
N6 EO 30	44 5 140 G
N6 EO 32	44 5 142 W
N6 GO 33	44 5 143 X
N6 EO 37	44 5 147 T
N6 EO 38	44 5 148 C
N6 O 39	44 5 149 D
N6 O 40	44 5 150 A
N6 EO 41	44 5 151 X
N6 EO 42	44 5 152 Y
N6 EO 44	44 5 154 S
N6 GO 47	44 5 157 V
N6 O 48	44 5 158 E
N6 GO 49	44 5 159 F
N6 EO 50	44 5 160 C
N6 O 52	44 5 162 S
N6 O 53	44 5 163 T
N6 O 54	44 5 164 U
N6 O 55	44 5 165 V
N6 O 59	44 5 169 H
N6 O 60	44 5 170 E
N6 O 62	44 5 172 U
N6 GO 64	44 5 174 W
N6 GO 64/S	44 0 059 M
N6 O 67	44 5 178 A
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N6 GO 69	44 5 181 N
N6 O 72	44 5 185 J
N6 O 73	44 5 186 K
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N6 GO 74/S	44 0 061 F
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N6 O 79	44 6 080 Z
N6 O 81	44 5 194 K
N6 O 81/S	44 0 063 H
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N6 O 108	44 5 418 T
N6 O 112	44 5 122 J
N6 O 113	44 5 123 K
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N6 GO 127	44 5 437 N
N6 O 131	44 5 441 S
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N6 O 211	44 5 421 N
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N6 Q 54	44 6 054 S	N6 T 38	44 7 128 S	N6 EZ 72	44 8 072 E
N6 Q 55	44 6 055 T	N6 T 39	44 7 129 T	N6 Z 74	44 8 074 G
N6 GQ56	44 6 056 U	N6 T 40	44 7 130 Y	N6 Z 75	44 8 075 H
N6 Q 58	44 6 058 E	N6 T 44	44 7 134 Q	N6 Z 79 AM.	44 8 079 M
N6 Q 59	44 6 059 F	N6 T 45	44 7 135 R	N6 25/3	68 1 206 C
N6 Q 60	44 6 060 C	N6 T 104	44 7 073 W	N6 30/1	68 0 310 J
N6 Q 62	44 6 062 S	N6 T 105	44 7 076 Z	N6 30/3	68 0 312 G
N6 Q 65	44 6 065 V	N6 ET 108	44 7 380 B	N6 30/4	68 0 313 H
N6 EQ 134	44 6 334 X	N6 T 115/0	44 7 387 W	N6 30/5	68 0 314 A
N6 EQ 147	44 6 347 C	N6 T 115/S	44 0 077 F	N6 40/1	68 0 409 K
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N6 R 6	44 4 166 V	N6 ET 132/Tetr.	44 7 105 U	N6 40/3	68 0 411 U
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N6 R 12	44 4 172 T	N6 ET 212	44 7 683 X	N6 40/7	68 0 417 S
N6 R 18	44 4 178 H	N6 ET 213/D	44 7 685 Z	N6 40/9	68 0 422 X
N6 R 26	44 4 186 J	N6 ET 213/S	44 7 684 Y	N6 50/1	68 0 503 H
N6 R 28	44 4 188 U	N6 ET 220	44 7 094 L	N6 50/2	68 0 504 A
N6 R 29	44 4 189 V	N6 ET 220/0	44 7 103 S	N6 60/1	68 0 602 L
N6 GR 101	44 4 361 G	N6 ET 411	44 7 982 K	N6 60/3	68 0 604 N
N6 ER 103	44 4 463 X	N6 ET 510	44 7 981 J	N6 80/1	68 0 802 D
N6 GR 104	44 4 464 Y	N6 Z 2	44 8 002 H	N6 80/2	68 0 803 E
N6 ER 117	44 4 477 V	N6 GZ 5	44 8 005 C		
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N6 AT 17	44 7 090 U	N6 Z 22	44 8 022 U	N7 D 19	47 3 019 S
N6 ET 19	44 7 093 K	N6 Z 41	44 8 041 F	N7 70/1	68 0 706 L
N6 ET 21	44 7 095 M	N6 Z 42	43 8 102 Y		
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40304	940 3 03 L
40312	940 3 14 E
40352	940 3 48 Y
40364	940 3 60 Y
40366	940 3 62 N
40405	940 4 04 A
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40506	940 5 04 E
40514	940 5 19 C
40515	940 5 20 H
40521	940 5 33 S
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403312/0,5	940 3 40 U
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403620	940 3 75 K
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44421	944 4 21 J
44541	944 5 41 S
45181	945 1 61 W
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45281	945 2 51 G
45361	945 3 41 A
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125306	925 3 06 U
125351	925 3 51 Y
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1253022	925 3 22 K
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1263544	926 3 90 V
1263545	926 3 91 J
136302	936 3 02 T
138261	938 2 11 Z
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138351	938 3 51 D
138405	938 4 05 V
138505	938 5 05 Z
138506	938 5 06 S
138701	938 7 01 D
142462	942 4 32 K
142517	942 5 27 J

N6 GG 147	44 4 354 H	N6 AH 160	44 4 440 C	N6 EM 39	44 5 039 S
N6-EG 158	44 4 365 C	N6 EH 209	44 4 689 A	N6-EM 41	44 5 041 U
N6 G 256	44 4 363 A	N6 EH 212	44 4 692 V	N6 M 44	44 5 044 X
N6 H 4	44 4 084 P	N6 EH 236	44 4 416 Q	N6 GM 47	44 5 047 S
N6 EH 8	44 4 088 T	N6 EL 3	44 7 023 L	N6 GM 48	44 5 048 B
N6 GH 11	44 4 091 N	N6 L 4	44 7 024 M	N6 M 49	44 5 049 C
N6 H 13/S	44 0 041 B	N6 L 5	44 7 025 N	N6 EM 51	44 5 051 W
N6 H 14	44 4 094 R	N6 L 16	44 7 036 R	N6 EM 52	44 5 052 X
N6 H 15	44 4 095 J	N6 L 25	44 7 045 S	N6 M 53	44 5 053 Y
N6 GH 18	44 4 098 V	N6 EL 26/0	44 7 046 T	N6 EM 54	44 5 054 Z
N6 H 19	44 4 099 W	N6 L 32	44 7 052 Z	N6 M 55	44 5 055 S
N6 H 20	44 4 100 G	N6 L 35	44 7 055 U	N6 M 56	44 5 056 T
N6 H 21	44 4 101 V	N6 EL 40	44 7 060 D	N6 M 57	44 5 057 U
N6 GH 22	44 4 102 W	N6 L 42	44 7 062 T	N6 M 58	44 5 058 D
N6 H 23	44 4 103 X	N6 L 43	44 7 063 U	N6 GM 60	44 5 060 B
N6 H 24	44 4 104 Y	N6 L 48	44 7 048 E	N6 EM 62	44 5 062 Z
N6 EH 25	44 4 105 Z	N6 L 49	44 7 049 F	N6 EM 63	44 5 063 S
N6 H 29	44 4 109 D	N6 EL 101	44 7 319 H	N6 M 66	44 5 066 V
N6 H 32	44 4 112 P	N6 EL 102	44 7 320 E	N6 M 67	44 5 067 W
N6 H 33	44 4 113 Q	N6 L 112	44 7 332 W	N6 M 72	44 5 072 T
N6 H 34	44 4 114 R	N6 M 10	44 5 010 Z	N6 M 75	44 5 075 W
N6 H 35	44 4 115 J	N6 M 11	44 5 011 N	N6 GM 77	44 5 077 Y
N6 GH 41	44 4 121 Q	N6 M 12	44 5 012 P	N6 GM 77/S	44 0 049 K
N6 GH 41/S	44 0 045 F	N6 M 13	44 5 013 Q	N6 GM 79	44 5 079 A
N6 H 47	44 4 127 N	N6 M 14	44 5 014 R	N6 GM 79/S	44 0 051 D
N6 H 51	44 4 131 J	N6 M 19	44 5 019 W	N6 GM 80	44 5 080 Y
N6 H 57	44 4 137 Q	N6 M 20	44 5 020 T	N6 EM 83	44 5 083 P
N6 H 64	44 4 148 B	N6 M 21	44 5 021 Q	N6 GM 84	44 5 084 Q
N6 AH 102	44 4 382 W	N6 M 22	44 5 022 R	N6 GM 84/S	44 0 054 G
N6 H 116	44 4 396 U	N6 GM 29	44 5 029 Y	N6 EM 85	44 5 085 R
N6 H 127	44 4 407 Y	N6 GM 30	44 5 030 V	N6 GM 87	44 5 087 K
N6 H 131	44 4 111 N	N6 M 32	44 5 032 K	N6 GM 87/S	44 0 056 A
N6 H 138	44 4 118 V	N6 EM 33	44 5 033 L	N6 M 90	44 5 090 S
N6 H 139	44 4 419 T	N6 GM 34	44 5 034 M	N6 EM 92	44 5 092 Q
N6 GH 145	44 4 425 R	N6 M 36	44 5 036 P	N6 GM 93	44 5 093 R
N6 H 148	44 4 428 U	N6 M 37	44 5 037 Q	N6 EM 99	44 5 099 X
N6 H 158	44 4 438 W	N6 EM 38	44 5 038 Z	N6 M 100	44 5 100 H

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N6 AM 259	44 5 359 P	N6 EO 38	44 5 148 C	N6 GO 127	44 5 437 N
N6 EM 265	44 5 365 D	N6 O 39	44 5 149 D	N6 O 131	44 5 441 S
N6 M 268	44 5 068 F	N6 O 40	44 5 150 A	N6 EO 209	44 5 419 U
N6 M 269	44 5 369 R	N6 EO 41	44 5 151 X	N6 O 211	44 5 421 N
N6 EM 270	44 5 370 N	N6 EO 42	44 5 152 Y	N6 Q 1	44 6 001 W
N6 M 281	44 5 381 W	N6 EO 44	44 5 154 S	N6 Q 2	44 6 002 X
N6 M 286/S	44 0 055 H	N6 GO 47	44 5 157 V	N6 Q 3	44 6 003 Y
N6 M 291	44 5 091 P	N6 O 48	44 5 158 E	N6 EQ 4	44 6 004 Z
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N6 AM 417	44 5 619 C	N6 EO 50	44 5 160 C	N6 GQ 6	44 6 006 T
N6 M 471	44 5 371 B	N6 O 52	44 5 162 S	N6 EQ 7	44 6 007 U
N6 M 486	44 5 386 T	N6 O 53	44 5 163 T	N6 EQ 8	44 6 008 D
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N6 O 15	44 6 075 X	N6 GO 74/S	44 0 061 F	N6 EQ 29	44 6 029 Z
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N6 T 44	44 7 134 Q
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N6 ET 132/Tetr.	44 7 105 U
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N6 80/1	68 0 802 D
N6 80/2	68 0 803 E
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N7 70/1	68 0 706 L
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403312/0,5	940 3 40 U
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138701	938 7 01 D
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